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VETERINARY MEDICINE

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features in this issue...

Indiana Veterinary Medical Association Meeting

The Role of the Rumen in Nutrition

Bovine Anesthesia

Diseases of Chicks and Poults

Anthrax in Livestock

Virus Diseases of Dogs

New Therapeutic Agent for Treatment of Canine Dermatoses

Antibiotics: Their Production and Use

Business Principles of Veterinary Practice

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Indiana Veterinary Medical Association--68th Annual Convention

PRESIDENT G. Robert Oldham sounded the keynote for the 68th annual meeting of Indiana veterinarians, held at Indianapolis, January 9-11, 1952, by referring to the necessity for cooperation to solve problems presented by livestock diseases. Membership and active participation in the programs of local, state, and national associations were urged. United effort for seeking truths which may be applied in everyday practice will assist in successful control of animal pestilence. In this manner, up-to-date professional service is made available to Indiana livestock growers; thus assuring a healthy industry and state economy.

Dr. M. M. Coble

Dr. E. W. Spieth

Dr. W. W. Garverick

Following the precedent of former years, most of the literary discussions appear on the following pages of this issue of VETERINARY MEDICINE. Exceptions include discussions that accompanied the showing of motion pictures, of which there were several, those that have been published elsewhere, and those by speakers, who for reasons not known, failed to include manuscript material.

The evening session of the first day was devoted to discussions of especial interest to those practitioners who handle small animal patients. Dr. R. L. Rudy, assistant professor of veterinary surgery, Ohio State University, Columbus, presented two motion picture films with explanatory comment. The first illustrated fracture reduction by the use of modified Thomas splints, casts, Stader and Kirchner skeleton fixation splints, and intramedullary nailing. The second dealt with methods used at the Ohio clinic for repair of diaphragmatic hernia. Doctor Rudy prefers the abdominal approach and the sequences shown vividly portrayed expert technic. Such discussions do not lend themselves to publication because photographic sequences cannot accompany text material. Only those present profit from this type of visual teaching, which is characterized by its clarity.

Clinical aids and modern advances in small animal medicine, with special reference to the eye, were presented in two discussions by Dr. Harlan E. Jensen, practitioner and director of the Jensen Animal Hospital, Cleveland, Ohio. These lectures were illustrated with beautiful motion pictures and slides. Subjects covered included, in addition to procedure for relieving various anomalies of the eyes of dogs, fracture work, ear trimming, surgical technic for the relief of conchal hematoma, draining of the external ear canal, and other considerations, both surgical and therapeutic, that are routine problems presented practitioners in urban areas.

This meeting convened six sessions, including the opening session of the first day and the evening program referred to in the paragraphs above. Four other sessions were devoted to discussions of a variety of problems which were led by authorities of national reputation.

The Committee on Diseases reported mastitis to be a serious problem. Promiscuous use of antibiotics by dairymen has not in any wise favorably affected the situation or disease inci-

dence. "The control of mastitis is more than the hired man's ability to give a cow a shot in the teat." The Committee expressed the opinion that the dairyman must be taught the necessity of good herd management (in the light of disease control), proper milking procedure, and the importance of calling his veterinarian early for diagnosis and treatment.

The Committee on Swine Diseases reported that colitis and gastritis, transmissible gastroenteritis, hog cholera, swine influenza, baby pig diseases, pneumonia, dysentery, atrophic rhinitis, and gut edema occurred in frequency in approximately the order given. Disease toll among swine varied little from that reported in previous years. The simple recommendation was an admonition to continue aggressive action and to strive for accurate diagnosis of all disease outbreaks.

The Committee on Small Animal Diseases reported positive rabies diagnosis in 518 dogs during the fiscal year. Incidence was reduced somewhat from previous year's total, but is considered too high.

During the course of the meeting, arrangements were made for both radio and television programs. In these, visiting authorities and leaders in Indiana were featured for discussions of interest to farm groups.

A total of 425 registered at this meeting of which 319 were veterinarians. Action was taken during the business session on 34 new applications for membership.

Officers selected to serve the Association for the ensuing year were: Marvin M. Coble, Columbia City, president; Emmett W. Spieth, Jeffersonville, president-elect; Ernest S. Weisner, Goshen, vice-president; and Wade W. Garverick, Zionsville, secretary-treasurer.

The meeting for 1953 was announced as scheduled for January 14-16. Headquarters will be the Hotel Severin, Indianapolis.

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Two New Breeds of Meat Type Hogs Developed by Breeding Research

Two new breeds of meat type hogs have been developed and admitted for registry by the Inbred Livestock Registry Association of St. Paul, Minn. One of these, the Beltsville No. 1, was developed in the Bureau of Animal Industry's experimental herd at the Agricultural Research Center, Beltsville, Md. The other, Maryland No. 1, was developed cooperatively by the Maryland Experiment Station and the Bureau of Animal Industry at Queenstown, Md. Both carry a large percentage of the blood of Danish Landrace hogs, a breed imported in 1934, primarily for experimental purposes.

The Beltsville No. 1 was developed from crosses made in 1934 and the breed traces to six Landrace sows, seven Landrace boars, and three Poland China boars. It carries approximately 75% Landrace and 25% Poland China blood and is about 35% inbred. The color is black with white spots. The hog is intermediate in size and similar to the Landrace, with a long body, little arch of back, smooth sides, and less fat than most hogs. The hams are plump and well muscled to the hock, the bone rather small, and the ears drooping and rather large. When slaughtered, the five preferred, trimmed cuts average 49.5% of the live weight at slaughter. The five cuts are hams, loins, bacon, shoulder picnics and shoulder butts. Dressed weight is about 80% of live weight. These percentages are about the same for the average market hog, but both new breeds have a higher proportion of lean to fat.

The Maryland No. 1 line was established in 1941 and carries approximately 62% Landrace and 38% Berkshire blood. The ancestry traces to three Landrace boars, six Berkshire sows and one Berkshire boar, and is about 30% inbred. Hogs of this new breed are black and white spotted and are intermediate in conformation between the Landrace and Berkshire. The back is slightly arched and of medium width. The head is moderately long and the ears erect or slightly drooping. The sides are long, deep, and smooth, and the hams well rounded and plump. When slaughtered, dressed weight of the Maryland No. 1 hogs is about 79% and the five preferred, trimmed cuts average about 50% of the live weight.

The development of the Maryland No. 1 breed is unusual in that all the land, equipment, breeding animals, and necessary funds were placed at the disposal of the cooperating agencies by a private organization. The work was all conducted at Blakeford Farms, Queenstown, Md.

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Swedish investigators have recorded that dairy cows spend one-half their time grazing good pasture and the remainder chewing cud and resting. The same workers observed that a cow weighing 1,150 lb. will consume 176 to 198 lb. of green herbage during a 24-hour period.—*Prof. C. F. Huffman.*

▼ ▼ ▼

Antihistamines and detoxifying agents, when used early in the course of gut edema, keep mortality rate at a minimum.—*C. M. Rodgers, D.V.M.*

The Role Of The Rumen In Nutrition*

C. F. HUFFMAN,** East Lansing, Michigan

FABRICATION of feeds should take into consideration the nature of the digestive tract of the class of animals under consideration. Efficiency of conversion to human food in the form of eggs, meat and milk depends in no small part on the working-over which feed receives in the digestive tract. The places in the gut where fermentation takes place will be discussed and then some consideration will be given to fabrication of feeds in order to make them better adapted to the animal's needs.

Let us ascertain where the fermentation vats are located in a few of our farm animals. One of the simplest digestive tracts is possessed by the pig, although it frequently is difficult to keep filled. This tract is similar to ours except than in man the cecum usually does us more harm than good. Feed the pig eats goes directly to the stomach, then to the small intestine, where it is digested by the enzymes. The digested portion is absorbed. The remaining part passes to the cecum, which is about a foot in length and holds about 0.3 gal. From the cecum, the material passes into the large intestine, which is about 16 ft. long and holds 2.3 gal. The cecum and large intestine make up the pig's fermentation vat.

The gut of the chicken, although abbreviated, is neverthless more complicated than that of the pig. Feed goes to the crop and then to the true stomach (proventriculus); then to the small intestine where the same type of digestive changes take place as in other animals. The chicken is unique in that instead of the traditional one, two ceca are present which are about 7.6 in. in length. A large fermentation vat is thus furnished in proportion to the size of the animal. The large intestine is short.

The digestive tracts of ruminating animals such as sheep and cattle are unique. These animals start out at birth with a digestive tract similar to that of a pig; that is, only one functional stomach. The milk which the calf sucks from its mother follows a path that leads to the true stomach.

The rumen and reticulum of the cow are really not separate compartments, but make up a fermentation vat having a capacity of approximately 300 lb. in a 1,200 lb. cow. Everything the cow eats or drinks passes to this vat where it is thoroughly mixed by the violent churning action of the powerful rumen walls. Heavy grain mixtures pass to the rumen as egg-shaped boluses and are quickly mixed with the roughage. Consequently the old idea that bulk is necessary in the grain mixture is nothing more than a superstition. In the writer's work with the heavy feeding of linseed meal, which is one of the gummiest feeds known, animals were able to consume 18 lb. a day regularly without "gumming up the works." The ruminant has an auxiliary fermentation vat in the cecum and large intestine.

From the rumen and reticulum, feed passes through the omasum or third stomach into the true stomach. From this point on, the construction of the digestive tract is similar to that of the pig.

Location of the spacious rumen at the head of the digestive tract gives cattle and sheep a

*Presented at the 68th annual convention of the Indiana Veterinary Medical Association, Indianapolis, Jan. 9-11, 1952.

**Research Professor of Dairying, Michigan State College, East Lansing.

great advantage over such critters as the pig, chicken, horse, and other simple stomach animals when it comes to handling hay and silage crops. Location of the paunch at the head of the tract gives microorganisms which do the fermenting priority on the use of sugars, starches and water soluble proteins of the ration.

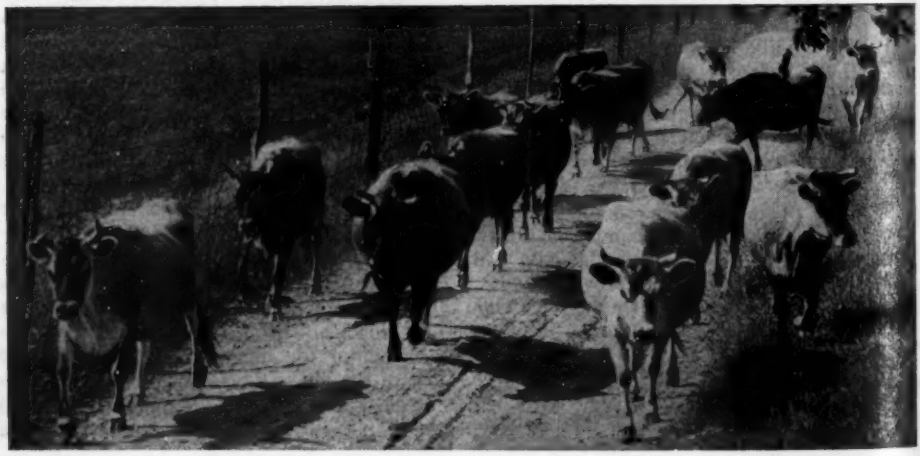
As a matter of fact, the location of the rumen has enabled the cow to contribute to human welfare by turning quantities of hay and grass into milk, that product also used for butter, cheese, and ice cream; not to mention those juicy steaks which most of us can still remember. Cattle and sheep also contribute to human welfare by consuming in large amounts the sod crops which do such a good job in tying down our precious heritage, the soil fertility. The great fermentation vat possessed by the ruminant contributes more than the prevention of soil erosion. These animals are soil builders. It is recognized that the proper use of sod crops in rotation actually increases the yield of grain crops. The fermentation vat of our cattle is one of our great national assets.

Importance of this vat can be appreciated best when one realizes that at least half of the dry matter of pasture grass or hay cannot be digested without the help of bacteria. There are countless numbers of bacteria and many large organisms (protozoa) which make their home in the fermentation vat. Some of these cannot be grown in the laboratory outside the rumen. A few can be identified when they are strained blue with iodine. Many of the microorganisms present in the rumen come from the feed and are believed to be just passing through for the ride.

When the cow eats roughage and grain, the bacteria hop on it, and in a short time have it digested. As a matter of fact, the great speed at which fermentation takes place should be the envy of every brew-master. The sugars, starches and other simple compounds are used first; fibrous feeds are digested later. Most of the digestion is complete at the end of 12 hours after feeding. Cud chewing, however, aids by producing more cracks and crevices in the forage for the bacteria to crawl into more easily.

Organic acids are produced during fermentation. About three-fourths of these are made up of acetic acid. Propionic and butyric acids are also produced in significant amounts. In addition, there may be some lactic acid, which is the same as found in sour milk; also traces of pyruvic and formic acids. In order to prevent development of too much acidity in the paunch, the cow secretes about 120 lb. of saliva a day, which furnishes the equivalent of three-fourths of a pound of sodium bicarbonate. Saliva has other uses besides neutralizing acids.

Writers of poetry and prose all down the ages have raved about the sweet breath of kine. In a recent experiment, it was demonstrated why a cow's breath is so sweet. When onions or garlic are added to the saliva, a compound is revealed which covers up these odors. This animal has another mechanism for preventing too much acid in the rumen; absorption through the rumen wall. In the past, the opinion prevailed that such absorption was unlikely. Recent work, however, indicates that glucose, several drugs and short-chained fatty acids are absorbed through the rumen wall.



Gas Production

The principal gases produced during fermentation are carbon dioxide and methane; although traces of carbon monoxide, carbon disulfide, hydrogen and nitrogen are sometimes observed. Usually at the peak of rumen fermentation about two-thirds of the gas is carbon dioxide and one-third methane. In the ruminant, some of the gas passes through the rumen wall into the blood stream and is eliminated through the lungs. A large part, however, is eliminated by way of the mouth.

Occasionally, for some unknown reason, the gas-eliminating mechanism fails and bloat results. There are many theories which attempt to explain the cause. In the old veterinary books was found advice to cattlemen which, if followed, was supposed to prevent this condition. Never pasture cattle against the wind. Always pasture cows up hill and never facing down hill.

A theory long accepted but now in ill favor explained bloat on the basis of increased rumen fermentation when cattle were pastured on succulent legumes. Recent data indicate that the eating of pasture grass does not result in increased gas formation. Then there is the theory that bloat is due to eating too much feed too fast. Still another is "the lack of coarse roughage" theory, which is based on the need for coarse feed to tickle the wall of the rumen which is supposed to stimulate the belching mechanism. The "toxic gas" theory is based on the production of sufficient carbon monoxide, or hydrogen sulfide, to paralyze the rumen wall, thereby preventing belching. The most recent theory postulates that bloat is due to allergy. Some pastures, according to this theory, contain a compound which brings about a contraction of the lower end of the esophagus. This contraction would result in bloat.

Synthesis in the Tract

Although synthesis of dietary factors occurs in the cecum and large intestine of simple stomach animals, it really reaches its peak in the rumen of the ruminant. The good bacteria digest the feed by secreting enzymes and then absorb these products immediately. As a matter of fact, this explains in part the efficient conversion of roughage and other feeds consumed into feed constituents which can be used by the cow. Cost of fermentation is about 10% of the dry matter digested, which is certainly a fair price to pay for so great a job.

There are several kinds of bacteria which are believed to play a vital role in rumen digestion and synthesis. Most of the important microbes, however, have not been studied, since it is difficult to grow them outside the digestive tract. Certain kinds of bacteria are believed to be harmful when present in large numbers. A large rod-shaped organism, which has been dubbed the "cigar", appears to be one of these.

Microorganisms in the fermentation vat are capable of making a lot of good compounds needed by most animals. They can take simple nitrogenous compounds and convert them to a protein of high quality. Recent experiments have shown that the only form of nitrogen used by bacteria is ammonia. It is necessary for an enzyme (urease) to break down all forms of nitrogenous compounds, such as protein concentrates or urea to ammonia before the microbes can use them. This is no serious problem, however, since this enzyme appears to be present in ample amounts in the rumen. Ability of bacteria to step up the quality of protein explains why the amino acid balance is usually not considered in balancing the ration of ruminants. Recent experiments indicate that all of the essential amino acids are manufactured in ample amounts by fermentation vat bacteria.

The ruminant carries her vitamin factory with her at all times and does not need to visit the corner drug store to get a supply of thiamin, riboflavin, niacin, pantothenic acid, pyridoxine, folic acid, vitamin B_{12}, biotin and vitamin K. These and probably many other unknown dietary factors are synthesized. During World War II, rumen fistulas were made in three small Jersey cows. The weight of paunch in these animals resulted in pulling the holes larger, so that it was impossible to keep them closed with plugs. As a result, air circulated in the rumen. This affected fermentation since, under normal circumstances, feed is acted upon in the absence of air. The cows lost their appetites, the red cells became abnormal in shape, and the animals eventually died. This indicates the importance of proper rumen fermentation.

Some years ago the writer's studies on chemical changes in the rumen were initiated by removing the contents from a rumen fistula cow, which is a very laborious task. Contents were mixed and samples taken for chemical analyses. It was 6 p.m. Should we take the time to return the rumen contents and miss our supper, or should we fill the manger, let the cow have the pleasure of filling her

paunch? The latter was chosen, of course. But it did not work out according to plan. The cow lost her appetite. After three weeks of starvation, a visit was made to the slaughter house, the rumen borrowed from a freshly kil'ed steer, and poured into the patient. Her appetite showed marked improvement the next day. This was the first rumen transfusion in history.

How does the cow utilize the products synthesized by bacteria? There are two theories. One postulates that protozoa gobble up the bacteria and process them, so that they can be digested by the animal's own enzymes. The other theory assumes that the food-laden bacteria are carried down the digestive tract into the true stomach. After that, they are digested like any other feed. Recent research at the University of Illinois indicates that the latter theory is more likely.

Bacteria which play a vital role in rumen fermentation also are present in the ceca and large intestine of animals having simple stomachs and are even present in the large intestine of man. Of course, they are greatly handicapped by position, but when pigs or chickens are pastured on tender grass, the fermentation vat does a grand job. These short-gutted animals appear to digest tender grasses just as efficiently as do cattle and sheep. Of course, the bacteria are responsible for digestion of the dry matter of the grasses. When it comes to mature hay and pasture crops, ruminants do a much better job than the pig.

The next time you eat lettuce or celery or force yourself to eat some of that glorified pasture grass known as spinach, just give the bugs in your colon a little credit for a grand job.

Balancing the Diet of Rumen Bacteria

Researchers in South Africa working with sheep have shown that rations made up of poor hay or straw result in very little gas production compared with a ration of good alfalfa hay. Also, the addition of glucose to poor hay failed to stimulate fermentation. The importance of unidentified factors present in the ash of certain hays and not in others, needed for good digestion of either corn cobs or starch, has been shown by recent experiments at the Ohio Agricultural Experiment Station. Also, more riboflavin was manufactured in the rumen, the finer the corn was ground. Wisconsin workers found that the addition of urea to a ration of timothy hay was of no value to the ruminant unless starch also was used as a supplement.

There is some evidence that the vital role of cobalt in animal nutrition may depend on the need of certain vital bacteria in the rumen for this element. It has been shown that only ruminants suffer from a deficiency of cobalt.

In our dairy cattle nutrition investigation, studies are progressing on how to balance the diet of a few species of bacteria which are numerous in the rumen and cannot be grown outside the animal's fermentation vat. The possibility of increasing the efficiency of conversion of feed to food by stepping up the tempo of fermentation in digestive tracts of farm animals is an intriguing one.

The feces of cattle has long been used as an indication of the well being of the animal. Some feeds result in feces of very hard consistency, while other result in feces with soft consistency. The soft feces may be due to irritation of the tract by bacterial poisons or may be due to physiological effects on the tract. Cattle feces probably should be on the soft side due to the effect of the feeds. Pasture grass and most grains have water-loving compounds which take up water and soothe the tract.

Many years ago, cottonseed meal was believed to be constipating, but experiments have indicated that consumption of large amounts of this feed resulted in soft feces. Many feeders believe that ingestion of extra salt results in softer feces. This is true for the day following the first heavy feeding of salt, but after that, continued feeding of extra salt did not materially alter consistency.

The value of cow manure as a supplement to swine and poultry rations has been demonstrated. Many of the B vitamins are synthesized in the large intestine, but due to inefficient absorption pass out in the feces. Feeders have long believed that pigs following corn fed steers do better than when fed corn which has not taken the dramatic trip through the gut.

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More and more frequently, do we hear of diagnoses, tentatively at least, of circling disease (listeriosis) in cattle and sheep. Clinically, it is in many instances difficult to differentiate from rabies, ketosis (pregnancy disease in sheep), encephalitis, and others. The history of the outbreak, urine test, and autopsies are helpful. The positive identification of listeriosis depends upon the isolation of the infecting agent, *Listeria monocytogenes*. As yet, nothing in the line of treatment has proved to be effective though penicillin and sulfonamides have been tried. Deaths are frequent following this infection.

Bovine Anesthesia†

L. E. BOLEY*, D.V.M., Urbana, Illinois

ADEQUATE anesthesia is a major factor in successful veterinary surgery. Inadequate or incomplete anesthesia during surgical operations may be responsible for injury or death of the patient. Anesthesia, if properly applied, eliminates the acrobatic method of applying surgical treatment. It is of utmost importance to the surgeon in maintaining proper surgical technic throughout the operation.

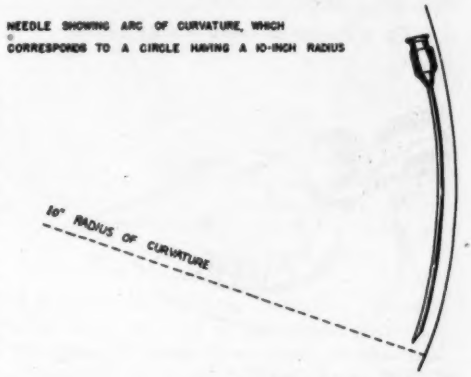
General anesthesia in cattle is not as successful as it is in horses. Anesthetized cattle in lateral recumbency may bloat, or pneumonia may result from inspired saliva or rumen content. Visceral organs may be displaced or crowded, rendering surgical treatment difficult. Despite these limitations, general anesthesia can be utilized in some bovine surgical procedures.

Nembutal® is useful in anesthetizing small calves for repairing fractures of the long bones. Wright[1] suggests 1 gr. intravenously for each seven pounds of body weight. He warns that nembutal should not be administered to calves under one month of age. It has been the writer's experience that this barbiturate can be safely administered to calves under one month of age. It should be administered slowly and the dosage varied with the stage of anesthesia desired. An initial dosage of 1 gr. per 20 lb. of body weight can be administered with safety.

Chloral hydrate is used intravenously as a sedative in combination with regional anesthesia or alone to produce complete anesthesia. This method of preparing nervous animals for surgery is desirable. Chloral hydrate is administered intravenously in a 7% solution until the desired hypnotic effect is reached. If complete anesthesia is desired, a dosage schedule can be estimated based on the weight of the animal. Wright suggests a dose of 4 to 6 gm. per 100 lb. of body weight.

A combination of chloral hydrate and magnesium sulphate or chloral hydrate, magnesium sulphate and pentobarbital can be used with satisfactory results. A more practical approach is to use these preparations intravenously to produce a light sedative effect and complete anesthesia by appropriate nerve block.

Regional anesthesia can be accomplished by infiltrating the operative field with injections of an anesthetic or injecting the solution on or near the nerve trunk supplying branches to the surgical area. In the latter, a thorough knowledge of anatomy is necessary.



Courtesy Jour. Am. Vet. Med. Assn.

Fig. 1. Curved needle for nerve block of eye.

Anesthesia of the Eye

A satisfactory and practical method of anesthetizing the bovine eye and its associate structures has been recently developed by Peterson[2]. This method saves time in that it eliminates the necessity of infiltrating the entire operative field. Peterson recommends the use of an 18 ga. 4½ in. needle, bent as indicated in fig. 1. The needle is inserted through the skin at a point where the supraorbital process meets the zygmatic arch (fig. 2, 3). The needle is placed through the skin so its concavity is directed posteriorly. The point of the needle is directed around the anterior border of the mandible and downward until it hits the bony plate forming the floor of the pterygopalatine fossa. The plunger of the syringe should be slightly withdrawn to check this point. Fifteen ml. of a 2% procaine hydrochloride solution is deposited in the area. The oculomotor, trochlear, abducent, ophthalmic and maxillary nerves will be blocked as they

†Presented at the 68th annual meeting of the Indiana Veterinary Medical Association, Indianapolis, Jan. 9-11, 1952.

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®Abbott Laboratories, North Chicago, Ill.

Fig. 2. Position of needle in living animal.

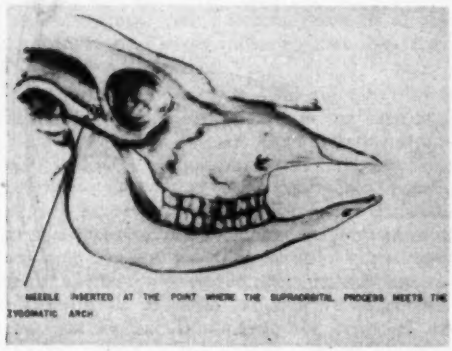
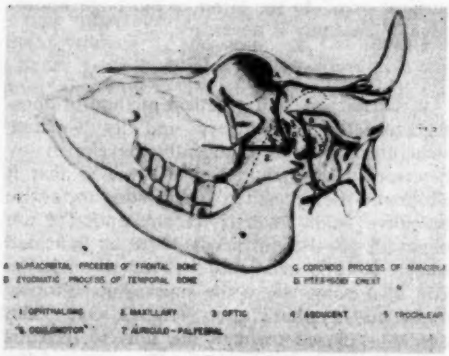


Fig. 3. Needle inserted at the juncture of the supraorbital process and zygomatic arch.



Courtesy Jour. Am. Vet. Med. Assn.

Fig. 4. Innervation of the eye and eyelid.

emerge from the foramen orbitorotundum (fig. 4). In order to obtain complete anesthesia of the eyelids, blocking of the auriculopalpebral branch of the facial nerve must be accomplished. The needle is withdrawn from the area of the foramen orbitorotundum until the point is just beneath the skin. It is then directed posterior and lateral to the zygmatic arch for a distance of from two to three inches. It may be necessary to direct the curved needle so the point is ventral to the hub. The curvature of the needle should be upward. In addition to producing complete anesthesia of the eye, Peterson states that this technic prepares the patient for dehorning operations and trephining of the frontal sinus.

Paravertebral Lumbar Anesthesia

Paravertebral lumbar anesthesia described by Farquharson[8] is a practical and an excellent method of producing regional anesthesia in the flank region (fig. 5). This technic will anesthetize all tissues necessary for rumenotomy, laparotomy or Cesarean section. Paralumbar block is accomplished by injecting a local anesthetic over or around the last thoracic and the first, second and third lumbar nerves. The site for making the injection over the last thoracic nerve is located by first identifying the head of the last rib. This is the site of injection which is approximately two inches lateral to the median line. In locating the sites for injecting the first, second and third lumbar nerves, Farquharson suggests that a line be drawn transversely to the posterior border of the summits of the first, second and third lumbar spinous processes. Two inches lateral to the midline on these intersections will be the site for the injection.

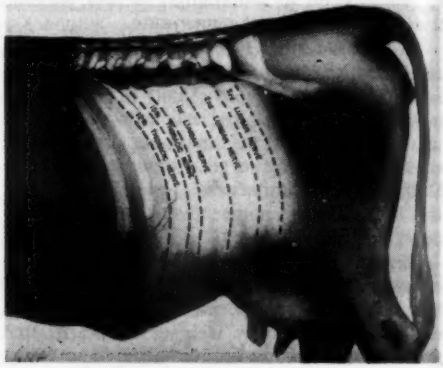


Fig. 5. Nerve supply to flank.

The hair is clipped, shaved and a skin disinfectant applied. A 16-ga. needle is used to puncture the skin at the site of the injection and is removed from the skin. A 3 to 4 in., 18 or 20 ga. needle is directed downward through the opening made in the skin and parallel with the median plane. Ten ml. of a 2% procaine hydrochloride solution is deposited at a depth of approximately 2 to 3 inches. An accurate guide to the depth of the nerve may be obtained when

the lumbar nerves are injected. If the needle strikes the transverse process the needle is at about the proper depth. Before the injection is made, the needle should be withdrawn slightly and directed slightly backward to just miss the posterior border of the transverse process. Not over 5 ml. of the anesthetic should be deposited over the third lumbar nerve. Paravertebral lumbar anesthesia, if administered accurately, will enable the surgeon to perform abdominal surgery through the paralumbar fossa in the standing position with little restraint.

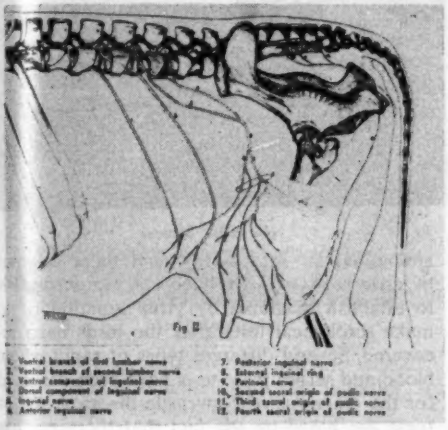


Fig. 6. Innervation of the teats and udder.

Anesthesia of the Udder

St. Clair[4] has described a method of anesthetizing the udder. The same technic is employed as described for paravertebral anesthesia. The second, third and fourth lumbar nerves are injected with a 2% procaine hydrochloride solution or any local anesthetic of choice (fig. 5, 6). This will provide anesthesia for teat surgery on the side the paravertebral block is applied. If surgery is required on both the right and left side of the udder, both sides must be blocked. To anesthetize the entire gland for amputation, the first lumbar nerve should be blocked to remove sensation from the anterior portion of the udder. The perineal nerve sends branches to the posterior part of the udder. This nerve can be blocked by injecting the local anesthesia in the midline and just below the vulva.

Anesthesia of the Extremeties

Habel[5] has described the surgical anatomy of the bovine limbs distal to the carpus and tarsus. Habel recommends that the branches of the superficial peroneal nerve be blocked above the middle of the metatarsus where they lie close

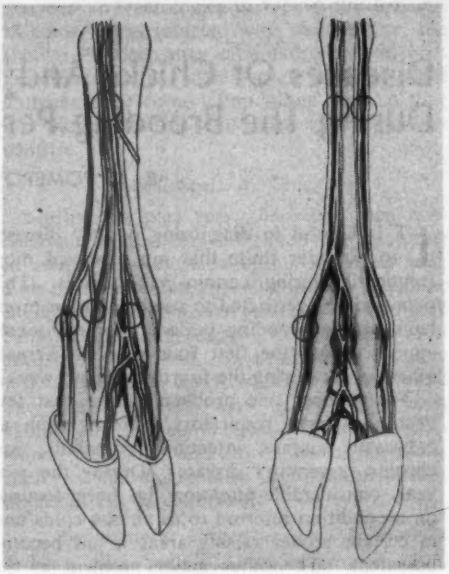


Fig. 7. Innervation of the hind limb.

to the extensor tendons. Injections should be made on both sides of the dorsal metatarsal vein lateral to the tendons. In the middle of the metatarsus the deep peroneal nerve can be blocked by deep injections between the tendons (fig. 7). This is a difficult procedure; therefore, it is suggested the deep peroneal nerve be blocked just above the interdigital space at the division of the extensor tendons. The plantar metatarsal nerves may be blocked by injections of a local anesthesia on both sides of the flexor tendons in the middle of the metatarsus.

For removal of a digit, regional anesthesia can be applied in the region of the fetlock joint. Injections of a local anesthetic may be applied in the area marked with a circle (fig. 7). A more practical method of producing surgical anesthesia is to perform a complete ring block around the leg.

Hyaluronidase Added To Local Anesthetic Agent

The addition of hyaluronidase to procaine hydrochloride solutions is helpful in applying regional anesthesia. This is especially true in deep nerve blocks and infiltrating large or deep areas. It is of value to some operators in paravertebral block and ring blocking of the legs. Hyaluronidase may be used at the rate of 125 T.R. units per 100 ml. of procaine hydrochloride solution.

(*Continued on page 279*)

Diseases Of Chicks And Poults Observed During The Brooding Period*

B. S. POMEROY,** D.V.M., M.S., Ph.D., St. Paul, Minnesota

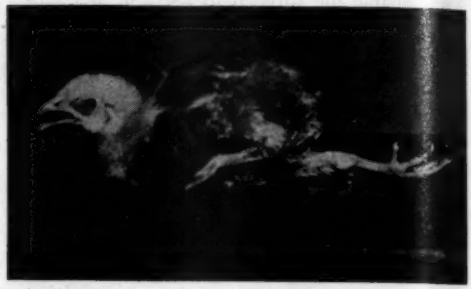
IT is helpful in diagnosing poultry diseases to consider those that are observed most frequently during certain age periods. This paper will be restricted to some common problems of the brooding period. Some diseases appear during the first four weeks; whereas, others occur during the fourth to eighth weeks.

The number one problem in the past few years has been respiratory ailments such as Newcastle disease, infectious bronchitis, and chronic respiratory disease. During the past year, considerable attention has been focused on a condition referred to as air sac colds and in certain broiler raising areas it has become prevalent. The other major problem in the Midwest, which has plagued the poultry industry for many years, is pullorum disease and the recognition of variant types has further complicated the control program. Recent advances made in control of cecal and intestinal coccidiosis by the use of coccidiostatic agents has altered the approach.

Respiratory Infections in Baby Chicks

In making a differential diagnosis of respiratory infections in baby chicks, it is necessary to rely on history, symptoms, and postmortem findings, and to supplement these with laboratory tests. In Newcastle disease, the usual chain of symptoms includes gasping, sneezing, and depression, followed by nervous manifestations. It is impossible to differentiate Newcastle disease, infectious bronchitis and so called air sac colds on the basis of respiratory symptoms alone. If nervous symptoms develop, such as twisting the head, tremors, and paralysis, a tentative diagnosis of Newcastle disease is justified. However, their absence does not preclude the diagnosis of Newcastle disease because outbreaks in chicks may occur without manifestation of nervous symptoms.

Gross lesions produced by these respiratory diseases are primarily accumulation of exudate in the trachea and bronchi and a thickening and clouding of the posterior thoracic and abdominal air sacs. How can these diseases be differentiated? The laboratory procedure is to establish diagnosis by virus isolation or to make serological tests after the birds have recovered. Several different types of rapid whole blood and serum plate tests have been designed for the diagnosis of Newcastle disease. All of these are based on the fact that the virus has the ability to cause agglutination of chicken red blood cells. This agglutination appears much like the reaction that occurs in the rapid whole blood pullorum test except that clumps are red instead of blue. If the serum contains antibodies at a high level, no agglutination of the red blood cells results; but if no antibodies are present, red blood cells are agglutinated by the antigen.



Newcastle Disease

Whole blood and serum plate tests have certain limitations which have restricted their use in the field, as well as in the laboratory. Because there are no tests which can be used under field conditions to differentiate Newcastle disease, infectious bronchitis, and chronic respiratory disease, there has developed an increasing tendency on the part of laymen to call all the respiratory infections that produce changes in the air sacs, air sac colds. This has contributed to confusion and has led many to the conclusion that air sac infection is a specific entity.

Treatment of flocks of chicks infected with any one of these ailments is unsatisfactory because there are no effective chemotherapeutic agents available. Treatment is entirely symptomatic, provided the brooding conditions are adequate.

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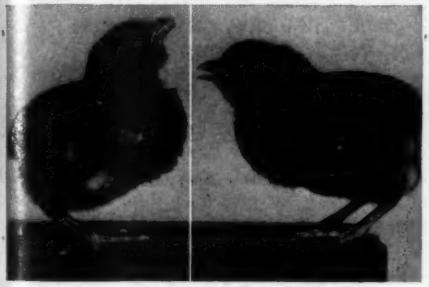
In the prevention of these respiratory conditions, an adequate management program is important and may be supplemented, as in the case of Newcastle disease, with a vaccination program. There is no vaccine for infectious bronchitis available which may be used on baby chicks. This is also true for chronic respiratory disease. Information on the use of antibiotics for treatment of chronic respiratory disease is so meager that no specific recommendations can be made at this time. From *in vitro* studies, it has been found that aureomycin, streptomycin, chloromycetin® and



Laryngotracheitis

terramycin are effective against the causative agent, while penicillin and sulfonamides are ineffective.

Pullorum Disease

The pullorum control program has made tremendous strides in reducing the incidence of this disease in the Midwest; however, the recognition of the variant type has complicated the program. Since 1947, isolates in the diagnostic laboratory have been typed serologically and at that time about one-third of the pullorum breaks were noted to be the variant type. Since 1947, a decrease in incidence of the variant type has been noted.

The only way types can be identified is by serological procedures. If there is reason to suspect the presence of a variant type in an adult breeding flock, that flock should be tested with a polyvalent whole blood plate antigen which contains both standard and variant strains. If reactors are found to the polyvalent antigen, retest of reactors with standard and variant antigens is important. If no reaction is noted with the standard antigen, and a good reaction occurs with the variant antigen, a tentative diagnosis of the variant type may be made. This should be verified by the isolation of the pullorum organism from reactors and serologically typing the isolates. In some flocks infected with variant type, the standard antigen may miss as high as 90% of the infected birds. The variant and polyvalent antigens have certain limitations because they are more sensitive and false reactions may confuse.

Coccidiosis in Chicks

During the past year, there has been considerable interest shown by feed manufacturers in adding coccidiostatic agents to mixed feed. This trend undoubtedly will continue and some predict that these agents will be added to feed as a standard ingredient. Veterinarians must recognize this trend. In using these drugs at low levels, losses from coccidiosis of the cecal and intestinal type may occur. The drug should not be condemned. Infected flocks should be treated with one of the sulfonamides, such as sulfaquinoxaline or sulfamethazine, added to the feed or water.

Salmonella Infections in Poults

Salmonella infections are still the major problem in turkeys. Paratyphoid infections are more prevalent than pullorum disease, and an occasional outbreak of fowl typhoid and paracolon infections is noted in poults under four weeks of age. It is rather difficult to differentiate these conditions on the basis of history, symptoms, and postmortem findings. The most common lesions are cecal plugs and necrotic foci in the liver. In pullorum disease, abscesses in the lungs and other organs may be noted also. It is important to follow through with a laboratory examination.

During the past two years, some areas have been testing the turkey breeding flocks for one type of the paratyphoid infection, namely, *Salmonella typhimurium*. This program is concerned primarily with detecting the infected flocks by testing the blood serums at the time flocks are tested for pullorum disease and following through with autopsies on birds that react to the tests. Because there are at least 50 different species of paratyphoids that have been isolated from poults and the testing program concerns only one type, isolation and serological identification of the Salmonella strains are important. Since there is considerable movement of turkey hatching eggs from one section of the country to another, the typing of the isolates is necessary to identify the source of infection.

In the treatment of Salmonella infections in poults, sulfonamide drugs and the newer antibiotics have been used. Of the former, sulfamethazine, sulfadiazine, and sulfamerazine are

®Parke, Davis & Co., Detroit, Mich.

Differential Diagnosis of Respiratory Diseases of Fowl

	Laryngo-tracheitis	Infectious Bronchitis	Newcastle Disease	Fowl Pox	Chronic Respiratory	Infectious Coryza	Fowl Cholera	Aspergillosis
Etiology	Virus	Virus	Virus	Virus	Virus	*H. gallinarum*	*P. multocida*	*A. fumigatus*
Species susceptible	Chickens and pheasants	Chickens	All birds	All birds	Turkeys Chickens	Chickens Turkeys (exp.)	All birds	All birds
Age and seasonal occurrence	Young adults Adults—fall, winter	All ages Chicks—spring Adults—fall, winter	All ages Chicks—spring Adults—all seasons	All ages Adults—fall, winter	All ages All seasons	Young adults Adults—fall, winter	Young adults Adults—fall, winter	Chicks and Poults—spring Turkeys—fall
Incubation period (hr.)	48-72	18-24	2-15	7-14	3-4 da. 2 wk. or more	24	1-2 da. to weeks	Days Weeks
Duration (days)	5-21	Chicks 5-21 Adults 4-10	Chicks 2-4 wk. Adults 4-10	2-4 wk.	Months	10 da. to months	1-2 wk. to months	Days Weeks
Rate spread	Rapid	Very rapid	Rapid	Slow	Slow	Rapid	Rapid to slow	Slow
Mortality %	5-60	Chicks 0-9 Adults 0-5	Chicks 0-100 Adults 0-60	0-50	0-10	0-25	5-75	Chicks and Poults 5-25 Adults 5-10
Nasal exudate	Present	Present	Occasional to absent	Occasional	Present	Present	Present Chronic type	None
Facial swelling	Occasional	Chicks—Occasional	None	Occasional to prevalent	Turkeys—sinusitis	Edematous subcut.	Prevalent in chronic type	None
Larynx—trachea	Blood false membrane	Mucus	Mucus	False membrane larynx only	Mucus	Mucus	Mucus	Mucus
Air sacs cloudy or caseated material	Occasionally	Usually	Usually	Occasionally	Usually	Occasionally	Usually	Usually
Swollen wattles	Occasionally	None	None	None	None	Occasionally edematous	Caseated frequently	None
Lungs	Congestion	Plugs in bronchi	Bronchopneumonia Chicks 0-50%	Congestion	Exudate and plugs in bronchi	Congestion	Caseated and pneumonia	Exudate and plugs in bronchi
Nervous symptoms	None	None	Adults 0-25%	None	None	None	Occasionally	Rarely
Effect on egg production	Decreased for a few weeks	Cessation in few days	Cessation in few days	Decreased 4-8 wk.	Decreased for weeks	Decreased for weeks	Decreased for weeks	?
Recovery immunity	Good	Good	Good	Good	Incomp.	Incomp. poor	Incomp. poor	?
Vaccine immunity	Good	None Control immunization	Killed, intranasal live virus	Good	Unknown	Incomp. poor	Incomp. poor	?
Useful drugs	None	None	None	None	Argyrol Silver nitrate Streptomycin Aureomycin	Sulfathiazole Sulfamethazine	Sulfa drugs Sulfaquinoxaline	None Change: contaminated litter
Carriers in recovered birds	Yes	Yes	Incomplete info. No	No	Yes	Yes	Yes	?

the drugs of choice. However, one must watch toxic effects. Poults are much more sensitive to any change in the water than chicks and the water intake must be checked carefully when one of this group of chemotherapeutic agents is used. At the first signs of dehydration, the drug should be withdrawn. The maximum period of use is three or four days at any one interval. Again, the newer antibiotics such as aureomycin and terramycin have been used at high levels (100 gm. or more per ton of feed) with variable field results. Because of the lack of experimental information concerning the feeding of these drugs at high levels for Salmonella infection, their use should be limited until more evidence is available.

Respiratory Infections of Poults

Another matter which has caused considerable confusion to the turkey and broiler grower is the indiscriminate use of the term air sac infection. Involvement of the air sacs in poults is much more common than in chicks. There are many etiological agents. Newcastle disease virus may cause thickening, but this disease is rather infrequently observed in poults.

Aspergillus infection has occurred rather frequently and accumulation of exudate in the air sacs and thickening of their walls commonly are found associated with mold infection. Unless the lungs are examined closely for small characteristic nodules, this condition may be overlooked. In all probability, aspergillosis may be expected frequently this spring because of the poor quality of the straw and shavings used as litter. The source of infection may not be limited to these materials because aspergillosis has occurred in poults on wire.

In some outbreaks, the disease may be confused with Newcastle disease. Poults may show nervous symptoms such as twisting of the head and neck, incoordination, and paralysis that are difficult to differentiate. Because the poults also show severe air sac infections, a field diagnosis of Newcastle disease is sometimes made. If the brain is examined, in the case of aspergillosis, abscesses may be noted in the cerebellum, cerebrum, and brain stem. Nervous symptoms result from the destruction of brain tissue. Usually lung abscesses are also found. Rather infrequently, aspergillosis may involve the posterior chamber of the eye, resulting in blindness. The only treatment is removal of contaminated litter and keeping dust at a minimum.

The sinusitis-air sac type of infection in poults appears to be increasing. In some outbreaks, air sac involvement may be noted when the poults are only a few days of age and then when the poults reach four to five weeks, infected sinuses may be noted. In some flocks, involvement of the air sacs is the dominant type, whereas in others, sinus involvement is primary. If birds receive a severe shock from a sudden change in the weather or movement on range, death loss may be increased. The injection of 100 mg. of streptomycin into each infected sinus will give excellent results. The lower respiratory infection does not respond well to treatment, but recent reports indicate that chloromycetin gives considerable promise as a flock treatment.

There may be other causes of air sac infection such as fowl cholera organism and other unknown agents. The role of secondary invaders such as the coliforms and Pseudomonas organisms are not established but certainly contribute to some mortality.

Coccidiosis in Turkeys

Another disease of turkey poults that appears to be on the increase is coccidiosis. There are two reasons for this; one is the change in turkey production from a one brood flock to several broods started each year, and second, there has been a tendency for year-round production. The coccidial population has been built up on these farms to a point where young poults, two weeks of age, are developing clinical coccidiosis. In some cases, it is necessary to use a coccidiostatic agent in the feed to keep the disease under control. Because of difficulty in diagnosis, it is desirable to make scrapings of the intestinal tract and examine them microscopically.

Sulfonamides are rather effective in the prevention and treatment of coccidiosis in turkeys.

▼ ▼ ▼

Research conducted at the Louisiana Agricultural Experiment Station (La. Agr. Exp. Ann. Rept., 1949-50) indicates that both body and shaft lice of poultry can be controlled by treatment of the flock at ten to 12-week intervals. A 1.5% solution of lindane in varsol sprayed directly on the birds at roost at night was more effective than the same mixture painted on the roosts. There was no evidence that the eyes of the birds were irritated and no effect on egg production was noted.

▼ ▼ ▼

Further information is needed to make most effective use of hormones.

Anthrax In Livestock During The First Quarter Of 1952 With Special Reference To Outbreaks In Swine In The Midwest

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Washington, D. C.

DURING the past seven years, a yearly report on the national incidence of anthrax in animals in the United States has been published by the Bureau. However, because of the extensive outbreaks reported from certain areas of the midwest, heretofore considered free of the infection, it is believed that the data covering outbreaks for the first quarter of 1952 presented in this report may prove to be of interest and should be published at this time.

The outbreaks that occurred, especially in the midwest, have a number of unusual aspects. First, most were primarily in swine which ordinarily are highly resistant to the disease. Second, they occurred in non-infected areas in the winter, whereas the disease in swine usually appears only in known infected areas and is predominately a malady of the summer season. Third, infection was confined to swine and did not spread to other species. Other unusual features of the disease in swine were the large number of herds involved, its wide distribution, and the small losses despite the large number of animals affected. Available history and circumstantial evidence in most instances indicated the infection in swine is of food origin. There is little evidence to indicate that outbreaks have spread from farm to farm. The disease in swine in the Midwest during the first quarter of 1952 had a general pattern similar in many respects to the outbreaks in Illinois and Iowa reported in 1951.

Reports concerning outbreaks of anthrax in the first quarter of 1952 in the states of Illinois,, Iowa, Indiana, Michigan, and Ohio were furnished the Bureau of Animal Industry by state livestock sanitary officials and bureau veterinarians in charge of field stations. To give a general picture of the geographic distribution of the disease in a map showing the number of outbreaks reported from each state and the location of the counties in which the outbreaks occurred is included in this report. Table I shows the number of outbreaks, number of counties involved, and the losses of livestock for the first quarter of 1952 in Illinois, Indiana, Iowa, Michigan, and Ohio. A summary of this information follows:

A complete report of the incidence of anthrax in 1951 and comparative data on this disease from 1945 through 1951 will appear in the August 1952 issue of VETERINARY MEDICINE.

TABLE I

State	Number of Counties	Number of Outbreaks	Livestock Losses Swine	Cattle
Illinois	22	30	168	5
Indiana	46	106	300*	3
Iowa	17	28	27	3
Michingan	10	14	43	11
Ohio	49	217	308	9
Total	144	395	846	31

*Approximate losses

Illinois

Illinois reported 30 anthrax outbreaks in 22 counties with a loss of 168 swine and five cattle. Death losses were not great in each herd since animals responded to medication. Sows and pigs were chiefly affected. Contaminated feed was suspected as a source of the infection and the University of Illinois is reported to have isolated *Bacillus anthracis* from raw, imported bone meal. Eighteen of the 22 counties in which anthrax occurred were new areas with no previous reported history of anthrax. At the time this report was made, the disease was apparently on the decline.

Indiana

Indiana reported 106 anthrax outbreaks in 46 counties with a loss of approximately 300 swine and three cattle. Thirty-one of these cases were confirmed by laboratory diagnosis

*Pathological Division, Bureau of Animal Industry, Agriculture Research Administration, U. S. Department of Agriculture, Washington, D. C.

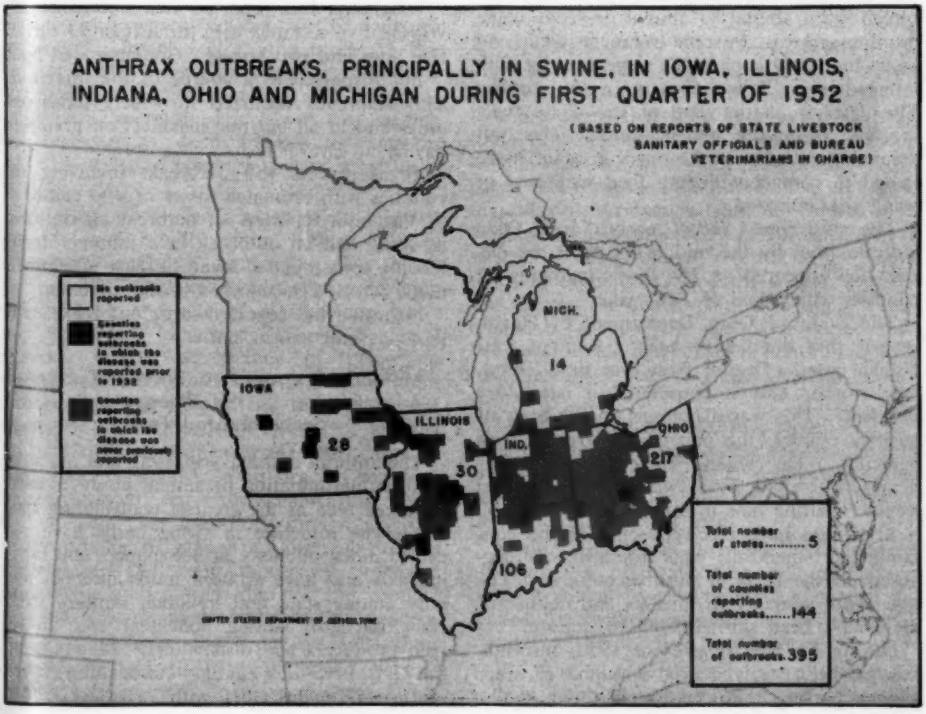
at Purdue University; the remainder were diagnosed by clinical evidence. The counties reporting anthrax outbreaks comprise the area in the state where the largest hog concentration exists. More supplemental feed is used in this area than in the southern part of the state where hog production is not as specialized. Contaminated feed is suspected as one of the sources of infection although no isolations of *B. anthracis* from feed have been reported to the Bureau by Indiana. Another possible source of infection may have been from local tankage and bonemeal in cases where dead hogs have been taken to local rendering plants. In an effort to control outbreaks, state officials alerted all veterinarians to be on the look-out for anthrax and warned officials engaged in testing farm animals to carry out strict disinfecting measures in traveling from farm to farm. Forty-five of the 46 counties in which outbreaks were reported have no known history of anthrax.

Iowa

Iowa reported 28 outbreaks in 17 counties with a loss of 27 swine and three cattle. Special interest was directed toward the possibility of contaminated feed as a source of infection since bonemeal had been incriminated in other areas. Tests of samples of feed submitted to the State Diagnostic Laboratory were negative for the presence of *B. anthracis*. Losses due to anthrax were extremely low. In only two instances was there spread of the disease to neighboring premises. Twelve of the 17 counties in which outbreaks occurred had no known history of anthrax.

Michigan

Michigan reported 14 outbreaks involving ten counties with a loss of 43 swine and 11 cattle. Michigan is one of the three states that prior to these outbreaks, has had no recorded occurrence of anthrax in livestock. Contaminated feed, particularly bonemeal, was suspected as the source of infection. No confirmed isolations of *B. anthracis* from suspected feed or supplements have been made. It was reported that an unconfirmed isolation was made from a mineral supplement containing bonemeal collected from the premises where the first case was diagnosed. The state has stressed the necessity of strict adherence to the accepted control measures such as restricting removal of carcasses from infected premises, and requiring the burning or deep burial


ANTHRAX OUTBREAKS, PRINCIPALLY IN SWINE, IN IOWA, ILLINOIS, INDIANA, OHIO AND MICHIGAN DURING FIRST QUARTER OF 1952
(BASED ON REPORTS OF STATE LIVESTOCK SANITARY OFFICIALS AND BUREAU VETERINARIANS IN CHARGE)
No outbreaks reported
Counties reporting outbreaks in which the disease was reported prior to 1952
Counties reporting outbreaks in which the disease was never previously reported
MICH.
14
IOWA
28
ILLINOIS
30
IND.
106
OHIO
217
Total number of states..... 5
Total number of counties reporting outbreaks..... 144
Total number of outbreaks 395

of infected carcasses. At the time of the report, the disease seemed to be on the increase in Michigan.

Ohio

Ohio reported 127 outbreaks involving 49 counties with a loss of 308 swine and nine cattle. Contaminated feed was definitely incriminated as one of the sources of infection. *B. anthracis* was isolated from a mixture of meat scraps and bonemeal, by the Ohio Department of Health and from a mixture of tankage and bonemeal by the Ohio State University. Extensive cooperative investigation of outbreaks in swine in Ohio were carried out by the Ohio State Livestock Officials, U. S. Public Health Service, the Food and Drug Administration, and the Bureau of Animal Industry. These revealed that contaminated feed was the source of the trouble. This finding was confirmed by laboratory animal inoculation and cultural tests.

While most of anthrax cases observed were in swine and were of a chronic nature, a few cases were classified as acute. The disease was characterized by a low morbidity and mortality rate and occurred in sows, boars, fat hogs, as well as suckling pigs. No evidence was obtained to indicate that the disease had spread from animal to animal or from swine to other species. In some instances, cattle and sheep that were kept in the same feed lot with infected swine failed to acquire the disease. The cases in cattle were of the acute type, sporadic in nature and scattered. The outbreaks in cattle, in almost every instance, were traced to contact with hog feed suspected of being contaminated.

The most recent report received from Ohio indicates that by the middle of April the disease had appeared on 264 farms involving 52 counties with a loss of 384 swine.

The State of Ohio Department of Health reports that there have been a total of four human cases. One of these was in a laboratory worker and is considered a laboratory accident. This was diagnosed on the basis of positive culture; the patient was treated with penicillin. The second case was in a carpenter who had been working for several weeks repairing bins in a feed mill. This mill is known to have received some of the contaminated bonemeal. This case also was diagnosed on the basis of positive cultures. The other two cases are in farmers and neither of them have been substantiated by culture.

During the first quarter of 1952, information has been received from a number of other states reporting anthrax outbreaks.

Incidence in Other States

California has reported two outbreaks involving two counties with the loss of three cattle.

Kansas has reported two sporadic outbreaks in cattle involving two counties with the loss of three cattle.

Missouri has reported five outbreaks in livestock in three counties with a loss of six cattle, one mule and 12 swine. Laboratory tests are being carried out on any samples of feed suspected as a possible source of infection.

New Jersey has reported 13 outbreaks involving seven counties with a loss of 14 cattle, 11 mink and six swine. The outbreak in mink and swine occurred on a farm where the owner purchased a carcass and fed the intestinal tract to his swine and the meat to 600 mink. The carcass was infected with anthrax and as a result of eating the infected feed, six pigs and 11 mink died. The other mink in the herd were given penicillin and bacterin and no further losses occurred. Three of the seven counties reporting outbreaks were heretofore considered uninfected areas. Diagnoses of the majority of the cases occurring in New Jersey have been confirmed by laboratory examination.

Oklahoma has reported five outbreaks involving five counties with the loss of 53 cattle, five hogs and two horses. Contaminated feed was not suspected as a source of the infection. The outbreaks occurred in widely separated areas and in all but one instance, on premises having no known history of anthrax.

Texas reports 154 outbreaks involving 62 counties with estimated losses of 400 cattle.

Wisconsin reported an outbreak of anthrax in cattle and an outbreak in a minkery from feeding contaminated meat. Eighty-nine of 92 mink involved succumbed to the infection.

Nebraska has reported three outbreaks, two in swine and one in cattle.

Methods Proposed to Prevent Further Spread of the Disease by Contaminated Feed

The anthrax outbreaks in 1952 and the subsequent incrimination of animal products used in mixed feed as the greatest contributing factor in the infection in swine herds have received much publicity in newspapers and farm journals and have aroused much interest, not only among state and livestock sanitary officials, but also among bonemeal and mixed feed producers and distributors. Members of the U. S. Livestock Sanitary Association representing 16 states, met with officials of the

U. S. Department of Agriculture, the U. S. Public Health Administration and Food and Drug Administration to discuss the unusual outbreaks and means of combatting them. Several resolutions concerning the problem were passed at the meeting:

1. The Secretary of Agriculture was asked to formulate and carry out regulations to prevent the importation of bonemeal, products containing bonemeal, or bones into the United States for use as feed or fertilizer, except when properly sterilized to kill anthrax spores.

2. The Secretary of Agriculture was asked to require feed manufacturers to tag all feed containing bonemeal moving in interstate commerce, certifying that the bonemeal has been properly sterilized.

3. Plans were made for each state to report monthly to the Bureau all outbreaks of anthrax occurring in each state so that the Bureau can issue a national report.

Anthrax in the United States, it should be remembered, is a complex situation, and the proposed changes in regulations concerning imported animal products will not completely solve the problem. The disease has been a constant seasonal problem in a number of areas for many years, and as a result there is the increased danger of spreading infection by flooding and consequent drainage of contaminated soil. Insect vectors and birds are important in many instances in the spread of the disease from infected animals. The practice followed by many livestock owners of feeding the carcasses of dead animals to swine is probably the most common source of infection in hogs.

In areas where the disease exists there is always the possibility of an anthrax-infected carcass being taken to a rendering plant where the infection may be widely spread through the handling and sale of meat, hides, wool, hair and other improperly processed animal products. The possibilities of dispersion through infected equipment, etc. in a plant that has been exposed in this manner are too numerous to mention. Outbreaks of anthrax in minkeries, and menageries and cases in dogs and cats have been traced to meat obtained from rendering plants. A feed-mixing plant that uses both foreign and domestic supplies of animal products can become contaminated with an improperly processed product in such a way that the end product may be contaminated in the mixing process.

Our previous studies[1,2] on incidence show that from 1945 to 1951 there has been a gradual but consistent increase of anthrax outbreaks of undetermined origin in new areas. Contaminated feed was suspected as the cause of the trouble in a number of these but in no instance was the infection traced to this source.

The source of infection in many of the outbreaks in Ohio has been traced to feed supplements containing imported bonemeal. Other types of contaminated animal products such as horn meal, hoof meal, meat scraps, blood meal and tankage, whether of imported or native origin, are equally dangerous when added to mixed feed.

Leonpacher[3] recently expressed the opinion that one of the possible primary factors responsible for the spread of anthrax into new areas, may be due to the increasingly wide use of stock feed mixtures containing rice products, such as brewers' rice, rice polish or rice bran from plants grown in anthrax infected areas in the Delta region of Arkansas, Louisiana, and Texas. These facts are mentioned so it will be recognized that the problem of control, even in the case of the unusual outbreaks occurring in the Midwest, is more than one of putting restrictions on importations of bonemeal. If the Bureau's recommendations on bone products are followed, only steamed bonemeal, special steamed bonemeal, or dicalcium phosphate will be used in mixed feeds. In the regular process of manufacture of these products the bones have been subjected to either heat or acidulation to such an extent that organisms that may be present, such as those causing anthrax, blackleg, or malignant edema, are destroyed and the product rendered safe for use. The Bureau does not have the authority to exercise sanitary control over the treatment or processing of bonemeal, meat scraps, or other animal by-products in plants that distribute their products within a state. The Bureau is contemplating regulations intended to prevent the use of imported raw bonemeal, green bonemeal, or bones in animal feeds unless processed under Bureau supervision.

Many states have recently passed regulations or resolutions concerning the handling of bonemeal and other animal products to prevent the introduction and spread of anthrax through contaminated feed.

North Carolina, as early as 1942, adopted a regulation requiring that all ground or crushed animal feeds containing bonemeal intended for feeding purposes be heated sufficiently to destroy all anthrax spores.

The Bureau has received reports that quarantines imposed against imported bonemeal

(covering movement of bonemeal within the state) have been either passed or recommended in the states of Alabama, Ohio, Indiana, Illinois, Wisconsin, Florida, and Tennessee. Virginia has passed a special regulation that prevents the importation of any livestock from areas in which anthrax has been diagnosed within 12 months previous to the importation date. Animals vaccinated with anthrax spore vaccine must be held six weeks before admission.

Wisconsin, in a special regulation, besides imposing certain quarantine restrictions on importation of bonemeal and the movement of this product, requires that all infected carcasses be either completely burned, partially burned and buried with quicklime, or buried with quicklime not less than six feet below the surface of the ground. No spore vaccines for the prevention of anthrax may be used except upon written authorization of the State Department of Agriculture, and then the sale and administration of these vaccines must be done only by a licensed veterinarian.

The Ohio Department of Agriculture has a regulation prohibiting the shipment of foreign bonemeal into the state. Bonemeal already in Ohio can be moved only after the owner has presented to the director of the Department of Agriculture evidence that it has been brought to a temperature sufficient to kill anthrax spores.

Montana has recently issued instructions to all veterinarians whose responsibility it is to supervise rendering plants in their district, to check sanitary conditions and fly control in such plants, and to determine if facilities, equipment, and methods used for processing, handling, and packing tankage and other products will insure their freedom from anthrax spores, and other dangerous microorganisms.

Some of the regulations passed by various states require the reprocessing or resterilization of bonemeal, meat scraps, and tankage that are now on hand in those states.

Prophylactic Vaccination and Treatment of Swine Against Anthrax

The information available on the efficacy of prophylactic vaccination of swine against anthrax is limited.

Since swine are generally regarded to be highly resistant and since the disease in swine in the United States up to this time has never been a serious problem, prophylactic vaccination even in known infected areas is not carried out on a wide scale.

However, in exposed herds it has been reported that the administration of anthrax antiserum, bacterins, and spore vaccines either singly or in combination have given apparent good results.

While a large percentage of swine affected with chronic anthrax will recover without treatment, the administration of anthrax antiserum or penicillin, singly or in combination, if given in early stages of the disease will hasten recovery. Excellent results following the treatment in both swine and cattle with penicillin have been reported.

Chronic Anthrax in Swine

Since most of the outbreaks in swine in the Midwest were of a chronic nature, it appears advisable to mention some of the aspects associated with this form of the disease in this species.

In chronic anthrax of swine, the lesions are of a purely local nature usually being confined to the cervical lymph glands and tonsils and more rarely to the mesenteric lymph nodes. Affected lymph nodes reveal hemorrhagic fibrous lymphadenitis. The lymph nodes may be enlarged and edematous and on cross section show a brick red color. Anthrax bacilli can be demonstrated microscopically in the affected lymph nodes and viable and pathogenic bacilli can be isolated from the lesions. In such cases, organisms are not present in the blood or spleen. During the healing process the anthrax bacilli in the lymph nodes are gradually destroyed by the defensive mechanism which swine possess in high degree.

Following an outbreak of anthrax in a herd of swine, the surviving animals apparently make a complete recovery but some of them may continue to harbor a chronic infection for long periods. When such animals are sent to slaughter, several weeks after an outbreak, they may appear normal on antemortem inspection, but on postmortem examination reveal chronic lesions in the tonsils and cervical lymph nodes.

These cases are important from a public health standpoint as the chronic lesions may contain active anthrax organisms and persons handling pork products prepared from such material may become infected.

As an aftermath of the widely scattered outbreaks in the Midwest many apparently recovered cases, no doubt, now exist in that area. It therefore appears this situation will have to be reckoned with in the immediate future. Figures for the first four months

of 1952 covering condemnations of swine slaughtered under federal meat inspection reveal that 126 carcasses were condemned, which is a marked increase detected on postmortem examination for any similar period during the past seven years.

Meat inspectors in abattoirs receiving swine from known anthrax areas should be on the alert for the appearance of chronic anthrax cases and should exercise special vigilance for the detection of this condition on postmortem examination.

The question may arise as to how long a time following recovery, chronic lesions in the cervical lymph nodes may persist and whether or not swine showing such lesions may spread the disease. How long such lesions persist is not definitely known. Since they heal slowly and the active anthrax bacilli are gradually destroyed, it is evident that the longer such animals are held following an outbreak the less possibility there will be of finding such lesions on postmortem examination. For example, swine that are released for slaughter in 21 to 30 days, following an outbreak are apt to show a greater percentage of unhealed lesions than those held for 60 days or longer.

Concerning the possibility that the disease may be spread by swine showing localized chronic lesions of anthrax in the cervical lymph nodes, it is generally believed that such animals do not shed organisms in the urine or excreta and therefore the possibility of infecting the soil in this manner appears to be remote. However, Van Es[4] has pointed out that in cases of chronic intestinal anthrax where open lesions exist in the alimentary tract, organisms may be eliminated with the feces.

Summary and Conclusions

Information received by the Bureau covering the incidence of anthrax in livestock for the first quarter of 1952 indicates that in the states of Illinois, Indiana, Iowa, Michigan, and Ohio a total of 395 outbreaks occurred involving 144 counties with livestock losses of 846 swine and 31 cattle.

During this same period outbreaks were reported from California, Kansas, Missouri, Nebraska, New Jersey, Oklahoma, Texas, and Wisconsin.

Two outbreaks in minkeries were reported from New Jersey and Wisconsin from feeding contaminated meat.

The available history and circumstantial evidence in most instances indicated the infection in swine in the Midwest is of food origin.

The outbreaks in swine were characterized by the following unusual aspects: (1) wide distribution; (2) occurrence in noninfected areas; (3) low morbidity and mortality rate; (4) failure to spread from one premises to another; and (5) failure to spread by contact from animal to animal or from swine to other species.

Reports indicate that there is a possibility that livestock may acquire anthrax by the consumption of contaminated feed.

Chronic anthrax in swine may become a public health problem under certain conditions.

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Bovine Anesthesia

(*Continued from page 269*)

Acknowledgment

The author wishes to express appreciation to Dr. W. A. Aitken, editor, for permission to reproduce illustrations from the *Journal of the American Veterinary Medical Association*, and to Mr. Carl Heldt, medical illustrator of the University of Illinois, College of Veterinary Medicine, for preparing the drawings.

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The Medical Service, Veterans Administration Hospital, Oakland, Calif., (Dr. Edgar Rosen reporting in *Am. Jour. Med. Sci., Jan.*, 1952) in discussing the treatment of trichinosis of man with cortisone comes to the conclusion that "cortisone therapy appeared to be of striking benefit in a moderately severe case of trichinosis." Further clinical trials are said to be warranted.

Annual Report of the Indiana State Veterinarian

The following are excerpts on the incidence of animal diseases from annual report prepared by Dr. Roy W. Elrod, chief administrative officer and state veterinarian.

BOVINE TUBERCULOSIS ERADICATION
July 1, 1950 to June 30, 1951

Total cattle tested (all sources)	196,592
Total reactors revealed (all sources)	343
Percentage of reactors	0.1 of 1%

RABIES

Number of positive heads	580
Counties placed under quarantine	5
Farms placed under quarantine	28

BRUCELLA TESTING

Number of new herd owners subscribing to cooperative testing program	778
Number of cattle in above herds	12,665
Total number of accredited herds	1,380
Total number of herds in process of accreditation	3,748

BRUCELLOSIS VACCINATION

Number of calves vaccinated in cooperative testing program	9,489
Number of calves vaccinated in other herds	17,304

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Balancing the Diet of Rumen Microorganisms

In the past, it has been customary to try to balance the ration of ruminants without consideration of rumen microorganisms. It now appears that rumen nutrition hinges on learning how to balance the diet of these bacterial forms. Results of several investigations point out the possibilities in this field.—*Prof. C. F. Huffman.*

▼ ▼ ▼

Production in beef cattle is measured by reproduction. It is important that every cow drop a calf every 365 days.—*G. T. Easley, D.V.M.*

▼ ▼ ▼

Intrauterine injection of a combination containing 200,000 units penicillin, 1 gm. dihydrostreptomycin, and 50 cc. merameth® (sterile solution containing 5% sodium sulfamerazine and 5% sodium sulfamethazine), the day following insemination gave superior results compared with other methods. Approximately 80% of one group of cows so treated conceived on subsequent services.—*G. T. Easley, D.V.M.*

®Sharp & Dohme, Philadelphia, Pa.

Biological Products for the Prevention and Control of Poultry Diseases*

B. S. POMEROY,** D.V.M., M.S., Ph.D.
St. Paul, Minnesota

The demand for professional service by the poultry industry has induced veterinary practitioners to devote more time to disease problems of producers of broilers, turkeys, geese, and eggs. The purpose of this discussion is to outline accepted facts relating to commonly employed and commercially available biological products prepared exclusively for control and prevention of diseases affecting all classes of poultry. General listing of these items is as follows:

Vaccines for virus diseases:
- (1) Newcastle disease
  - (a) killed virus vaccine
  - (b) live virus intranasal vaccine
  - (c) live virus wing-web vaccine
- (2) Fowl pox
  - (a) fowl pox live virus vaccine
  - (b) pigeon pox live virus vaccine
- (3) Infectious laryngotracheitis
  - (a) live virus vaccine
- (4) Infectious bronchitis
  - (a) live virus vaccine

Bacterins for bacterial diseases:
- (1) Fowl typhoid
- (2) Fowl cholera
- (3) Mixed infections

Antiserums for bacterial diseases:
- (1) Antihemorrhagic septicemia
- (2) Botulinus antitoxin

Diagnostic agents:
- (1) Avian tuberculin (intradermic)
- (2) Rapid whole blood plate antigens for pullorum disease
  - (a) standard pullorum antigen
  - (b) polyvalent pullorum antigen

Facts relating to each of these have been worked out by many authors. These are given in brief outline in the table (see page 281) and answer practical questions regarding use and what can be expected in age classifications of birds.

Live virus vaccines stimulate immunity response and effectively control certain poultry diseases. The author emphasized that they will not eliminate specific disease problems.

*Abstract of a paper presented at the 68th annual convention of the Indiana Veterinary Medical Association, Indianapolis, Jan. 9-11, 1952. (For full text see Proceedings Book, Am. Vet. Med Assn., 88th ann. meeting, Milwaukee, Wis., Aug. 20-23, 1951.)

**School of Veterinary Medicine, University of Minnesota, St. Paul.

Biological Products for Prevention of Poultry Diseases

Type of vaccine	Age of birds vaccine used	Most desirable age of birds to obtain maximum resistance	Rapidity of development of maximum resistance	Duration of maximum resistance	Desirable time to examine birds for "takes"	Danger of spread of vaccine virus	Length of danger period	Development of carriers from vaccination	Development of carriers natural infection	Systemic reaction	Method of application of vaccine
Newcastle Disease											
Killed	1 da.-adult	4 wk.+	14-21 da.	Variable	.....	None	None	No	No	No	Intramuscularly
Intra-N[1]	1 da.-adult	4 wk.+	7-10 da.	3-4 mo.-1 yr.	.....	Slight	2 wk.	No		Yes	Intranasally Aerosol
Live virus wing web	3 wk.-4 mo.	8-12 wk.	7 da.	1 yr.+	3-5 da.	Yes	3-6 wk.	No		Yes	Stick wing web
Fowl Pox											Stick or feather follicle
Chickens	1 da.-4 mo.	6-14 wk.	4 wk.	Life	5-7 da.	Yes	4-6 wk.	No	No	Yes	
Turkeys	6 wk.-9 mo.	8-12 wk.	4 wk.	6 mo.—revac. of breeders	5-7 da.	Yes	4-6 wk.	No		Yes	" "
Pigeon Pox											Feather follicle only
Chickens	8-wk.-adults	8 wk.-adults	4 wk.	60-90 da.	5-7 da.	Yes	4-6 wk.	No		No	
Turkeys	Not recommended										
Laryngo.	6 wk.-adults	8-16 wk.	10 da.	Life	3-5 da.	Yes	7-10 da.	No	Yes	No	Cloacal mucosa
Infec. Bronch.	6 wk.-4 mo.	8-12 wk.	4 wk.	Life	3-7 da.	Yes	14-21 da.	Yes	Yes	Yes	Intra-tracheally
Fowl Cholera	Questionable value										
Fowl Typhoid	Questionable value										
Mixed Infections	Questionable value										

[1]Intra-N—Intranasal

Virus Diseases Of Dogs: With Special Reference To Infectious Hepatitis*

GEORGE C. POPPENSIEK,** V.M.D., M.S., Ithaca, New York

AT the turn of the 20th century, the general behavior of entities known as viruses was described. Among those that fit the virus pattern was an agent described by Carré[1] in 1905, which he found in sick dogs and which subsequently became known as canine distemper virus.

Twenty years later, Laidlaw and Dunkin in England confirmed and extended Carré's work and introduced basic technics for investigation of all animal viruses.

After Laidlaw and Dunkin had completed their work, another 20-odd years passed with virtually nothing done in the investigation of infectious diseases of dogs until MacIntyre, Trevan and Montgomerie,[2] in England, recently described a virus disease of dogs characterized essentially by hyperkeratosis of the food pads and encephalitis. It was their opinion that the virus producing hard-pad disease differed from the distemper virus. They also were of the opinion that the distemper virus does not produce encephalitis. Verlinde,[3] in Holland, concurred in the opinion of the English workers that the Carré (distemper) virus by itself does not produce encephalitis. On the other hand, he postulated that the hard-pad virus might be a variant of the Carré virus, which he classified as type B virus, in contradistinction to type A, which produced typical catarrhal distemper. He is of the opinion that the Carré virus plus an exogenous or endogenous factor, will produce a demyelinating encephalitis.

Koprowski, *et al.*,[4] Cabasso and Cox,[5,6] and Gillespie,[7] in serum-neutralization and cross-immunity tests, respectively, have subsequently established the fact that immunologically there is no difference between the so-called hard-pad virus and the distemper (Carré) virus. It is important to note that Gillespie was unable to produce encephalitis in laboratory dogs infected by intravenous inoculation with the distemper virus after they had recovered from catarrhal distemper, even when he challenged these dogs intracerebrally.

With these facts in mind, then the question that must be settled is: Under what circumstances does the distemper virus produce encephalitis?

At about the same time that Laidlaw and Dunkin were investigating distemper in England, Green and his coworkers[8,9,10] in Minnesota were investigating a series of epizootics of encephalitis in foxes. Experimentally this virus did not produce encephalitis in dogs but did produce intranuclear inclusion bodies and other pathological changes similar to those described later by Rubarth[11] in Sweden. Siedentopf[12] confirmed the antigenic similarity of the viruses, and widespread interest became manifest in the disease which is now recognized as infectious hepatitis. It should be borne in mind that the term fox encephalitis should not be applied to the disease caused by the same virus in dogs. It does not produce encephalitis in dogs.

Infectious hepatitis is an insidious disease

*Presented at the 68th annual convention of the Indiana Veterinary Medical Association, Indianapolis, Jan. 9-11, 1952.

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having a symptomatology not unlike that of distemper in many respects. It is an endotheliotropic virus disease; a disease of the blood and lymph vessels, with varying degrees of liver involvement. It is interesting to note that its affinity for endothelial tissue (a phenomenon also seen in hog cholera) is rather unusual for a virus. This characteristic is usually attributable to the rickettsiae.

Symptomatology in Infectious Hepatitis

The features of illness have been described in detail by numerous authors[11,13,15,20,21]; but, for confirmation and review, it might be well to mention the salient ones observed in our laboratories. Following an incubation period of about five days after natural exposure, the period of clinical illness usually runs for one to six days. A leukopenia appears on the day after the first day of fever and usually persists through the febrile period. These two features of illness extend over a period of one to six days, averaging three to five days. Malaise and photophobia may appear on the second or third day of illness and persist for three to five days. Hyperexcitability or convulsions have not been observed, and only occasionally has tonsillitis or icterus been complicating.

Differentiating Characteristics of Infectious Hepatitis

There is one feature of illness seen frequently in severe cases that might be helpful to practitioners in differentiating infectious hepatitis from distemper. In animals wherein liver damage is extensive, there is a marked prolongation in the bleeding time[18]. This begins usually on the third day of fever and persists throughout the remainder of the febrile period. In occasional animals, this abnormal bleeding time is noted for one to two days after fever has ended. This prolonged bleeding time may be explained by the facts that, (1) prothrombin is apparently elaborated in the liver and liver damage interferes with its formation, (2) fibrinogen production is entirely dependent upon liver function,[14] and (3) the polysaccharide heparin, which inhibits coagulation, is liberated by the damaged liver.

A simple and practical technic for determining bleeding time in the dog is to shave a small area over the marginal ear vein. Then, holding the ear firmly, so that the dog will not shake its head, prick the vein with a sterile, 20-gauge needle. Blot the first drop of blood immediately and thereafter every half minute. An ordinary clean and soft desk blotter or piece of absorbent tissue paper (ordinary household facial tissues) may be used. Do not rub the area of the wound. Blot firmly but gently, and make every effort to prevent the animal from moving the ear unduly. By using this method, it has been found that the average bleeding time for a normal dog is one to two minutes. Dogs with uncomplicated distemper react as healthy animals. Patients severely infected with infectious hepatitis virus reveal a bleeding time prolonged from three to 45 minutes.

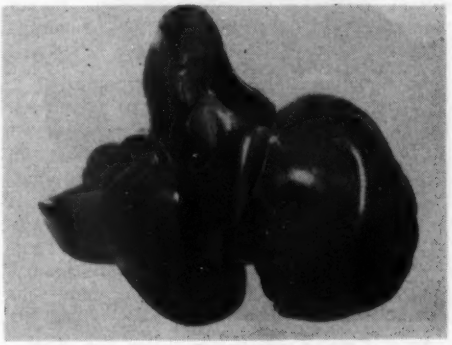

Fig. 1. Infectious hepatitis. Mottled liver, illustrating extensive distribution of areas of centrolobular necrosis.

There are other features of illness that will assist the practitioner in arriving at a differential diagnosis. Bronchopneumonia, seen commonly in distemper, does not occur in uncomplicated infectious hepatitis. Infectious hepatitis runs a short clinical course; distemper a prolonged course, extending over a period of several weeks. In a kennel, infectious hepatitis spreads relatively slowly, because it is spread by contact of the susceptible dog with either body secretions of the clinically ill dog[16] or the urine of recovered carriers[16]. Distemper, being air borne, spreads rapidly.

In about one-third of the recovered cases, a transient, bluish-gray corneal opacity, involving one or both eyes, appears. This apparently is due to edema of the substantia propria of the cornea and disappears within three to eight days with no residual effect[11,18,17]. This lesion has not been associated with distemper.

Leukocyte count is an extremely important differential feature in distinguishing infectious hepatitis from leptospirosis. Leukopenia characterizes the former; leukocytosis the latter[19].

In differentiating infectious hepatitis from toxoplasmosis, it has been found that the lymph nodes are enlarged in toxoplasmosis[18];

whereas this is not a prominent symptom of infectious hepatitis.

Autopsy Findings

On autopsy, lesions observed have been described. It might be well to stress a few of those changes most commonly seen, to refresh memory and to confirm the observations of others. There is usually a copious quantity of serous to sero-sanguineous fluid in the abdominal cavity with a webbing of fibrin, particularly on the serosal surface of the liver and gall bladder. The liver usually is swollen, friable and mottled, with irregular areas of centrolobular necrosis. (Fig. 1 and 2.) The gall bladder is edematous. Remembering that this disease affects the blood vascular and lymph vascular endothelium, one can understand that, with the rich plexuses of lymphatics in the lamina propria and perivascular connective tissue in the wall of the gall bladder, one would expect an escape of soluble protein through these damaged vessels. Also, mechanical obstruction to the flow of the filtrates in the bile concentrating process appears to be caused by congestion of the cystic lymph glands and peripancreatic lymph glands which normally drain the gall bladder.

Fig. 2. Close-up view of lobe of liver, dog, showing areas of centrolobular necrosis resulting from infectious hepatitis.

There are other lesions, such as interlobular edema and petechial hemorrhages on the thymus, congestion of lymph glands, and visceral hemorrhages that are seen commonly in this disease; but the aforementioned are the most salient and most common, in our observations.

Treatment

There naturally is considerable concern about the treatment of this disease. Some workers have described an acute hypoglycemia in infectious hepatitis with miraculous recovery following the intravenous use of dextrose. Although our studies have not been directed toward this therapy, limited tests have failed to confirm these reports. As in all virus diseases, antiserum has questionable value as a therapeutic agent. On the other hand, it has excellent potentialities as an immediate though transient prophylactic. Methods of immunization are under study in our laboratories at the present time and will be reported at a later date.

It is quite obvious that there is a great deal of work yet to be done in clarifying the virus diseases of dogs, but sound research programs are now under way. Through these efforts, once again, knowledge is being acquired that should provide answers to the more perplexing problems and lead to better disease control.

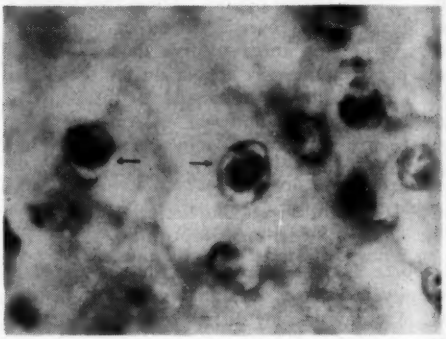

Fig. 3. Inclusion bodies (indicated by arrows), liver, dog.

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(*Continued on page 287*)

Periodicity of Microfilariae

Reference is made again to an article by Burch and Blair (*Vet. Med.*, 46:128 [April], 1951), a comment on this article by the writer (*Vet. Med.*, 46:211 [June], 1951), and a reply by Burch (*Vet. Med.*, 47:26 [Jan.], 1952). The attack on the article by Burch and Blair was not directed towards the product which they are offering for sale, but to their denial of the existence of periodicity of circulating microfilariae and their denial of its importance in diagnosis and therapy. This attack is resumed herewith.

If one is willing to concede that there is a microfilarial periodicity in the peripheral circulation, then one must also concede that the method used for locating the microparasites cannot overcome this fact. The problem, academically to be sure, but practically as well, in this writer's opinion, is one of establishing whether or not microfilariae exist in a given dog. Therefore, not only must there be a method used that makes possible the finding of the greatest number of microfilariae in a given quantity of drawn blood, but also one must consider whether or not periodicity exists.

Burch apparently has not read the article referred to originally, that by Schnelle and Young, *Bulletin of the U. S. Army Medical Department*, September 1944, since he refers twice to "nocturnal" sampling. This work, from the War Dog Reception and Training Center at Front Royal, where filariasis constituted the greatest single disease problem of about 5,000 dogs, showed that periodicity did exist, with a sharply higher level of microfilariae infiltration in the peripheral circulation at 4:30 p. m. than at any other hour between 8:00 a. m. and 9:00 p. m.

It was established further that this periodicity could be altered by changing the feeding habits of the dogs or by therapy. The work further indicated that the periodicity was due to retreat of the microfilariae to the spleen and perhaps to other abdominal organs under certain conditions. For example, when a standardized procedure was used, a count of 31 microfilariae per 0.1 cc. of blood serum was found in the blood from the radial vein. After clamping the splenic artery and allowing 25 minutes for this organ to empty, the circulating microfilariae in the radial vein totaled 188 per 0.1 cc. of serum. These variables deserve consideration.

In a personal communique from a physician* and wife from the island of Tahiti, it was stated that it was common knowledge on this island that the microfilariae in the peripheral veins reach the highest point at tea time. Both this physician and his wife are personally infected with filariasis and offered that such infection is universal in all human beings who live on Tahiti for any length of time. In addition, all animals, including dogs, on the island are infected. This would seem to establish the old and oft-repeated statement that nocturnal periodicity of microfilariae in man is also a myth and to support the contention of Schnelle and Young that microfilariae in the peripheral veins in the canine reach the peak at "tea time."

To comment on the sampling reported by Burch at four-hourly intervals on two dogs, attention is drawn to the fact that no history nor clinical data is supplied on the dogs, that is, there is no reference to the time of feeding, the routine, whether the dogs had received any therapy or not, or whether the routine had been changed. The study by Schnelle and Young indicated that all these factors can and did upset peripheral periodicity of microfilariae.

If the aim in the treatment of this disease is to reduce the number of circulating microfilariae and to sterilize or kill some of the adults, then it would seem that any reasonably accurate method of diagnosis and counting of circulating microfilariae will suffice. This is an attitude taken by many southern veterinarians and quite possibly is a justifiable one. If, instead, the question is one of accurate diagnosis of filariasis, or at least of microfilariasis, then veterinarians are not justified in ignoring microfilarial periodicity, regardless of the method of sampling, preparation, and examination of the blood.—*Gerry B. Schnelle, V.M.D.*

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Considering the pharmacological aspect of strychnine intoxication, its use as an agent for small animal euthanasia cannot be substantiated. Other agents are available for humane destruction that dictate a reasonable course of action.

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Hypopyon, collection of pus in the anterior chamber of the eye, responds readily to irrigation through a small incision at the corneoscleral junction.—*Harlan E. Jensen, D.V.M.*

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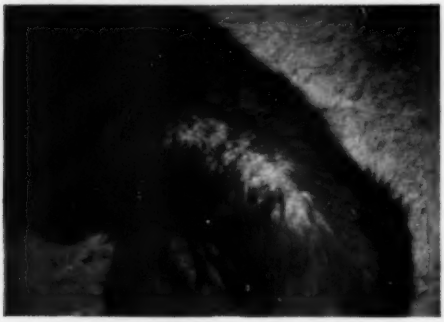
*Name on request.

A New Therapeutic Agent For Treatment Of Canine Dermatoses

LEE R. PHILLIPS, D.V.M., and B. STEWART BURKHARDT, D.V.M.,
Lakewood, Colorado

THE subject of skin diseases affecting dogs is perplexing. Undoubtedly every small animal practitioner has tried a host of medicaments recommended for treatment of anomalies involving the skin. The use of some preparations has resulted in relieving

Before Treatment



Nov. 15, 1951—Difficult case of eczema in Irish Setter, with lesions shown on back. Several areas are completely denuded. Condition was of two years' duration and all previous treatments with various medicaments had been unsatisfactory. First treatment was applied.

symptoms; however, the search is continuing for new and more efficient therapeutic agents.

As a result of this interest, a clinical study was undertaken at the writers' hospital to test a preparation, seleen,® containing 1% selenium sulfide in suspension with stabilizing agents and a detergent base. This communication is to report the findings. In a series of 40 cases, the effective properties of this new agent have been demonstrated.

Skin diseases treated in these trials included dry eczema with pruritus, moist eczema, fungus infections, scaling dermatoses, mange caused by *Demodex folliculorum*, and ectoparasites, including lice and fleas.

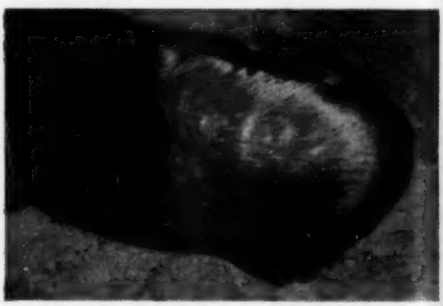
All cases were treated in a routine manner with the exception of follicular mange, which required a slightly longer and more continuous treatment.

Causative agents were identified by laboratory diagnosis whenever possible. Purple X light was used to diagnose fungus infections, skin scrapings were examined for ectoparasites such as mites, etc., and nonparasitic eczemas were examined for typical symptoms and lesions and for characteristic appearance. All cases treated were considered difficult.

Routine Method of Treatment with Seleen

1. Boric acid ophthalmic ointment was instilled into eyes and, in males, the scrotum was well covered with petrolatum.

One Week after Second Treatment



Dec. 6, 1951—Skin encrustations have been eliminated to a considerable extent. Redness of skin and itching ceased shortly after first treatment.

2. The hair was thoroughly wet with warm water.

3. Suspension was shaken and 1 to 2 oz. worked into skin of entire body, being careful around the scrotum and eyes. Sufficient amounts of warm water were sprayed on the dog to produce a good lather, and washing was continued. Seleen was rubbed especially well into severely affected areas. Three to 4 oz. were required in large breeds.

4. Suspension was allowed to remain in contact with the skin for five minutes in

®Abbott Laboratories, North Chicago, Ill.

almost all cases.

5. Then hair and skin were thoroughly rinsed, using a spray attachment.

6. Treatment was repeated at biweekly intervals. If necessary, mange cases were treated more frequently and the seleen was permitted to remain in contact with the lesions for 15 minutes.

Results

Some 40 cases were treated as outlined. In almost every case, results were recorded as excellent. Of those treated, 87.5% were completely controlled. Of the remaining 12.5%, 10.9% were partially controlled and the constant scratching stopped. The few cases which were not completely controlled were for the most part those infected with Demodex which, of course, might be expected. The results were the best that have been experienced with any previously used skin preparation. Seleen killed fleas and lice with a single application. Scratching was eliminated, usually after one treatment; the hair and skin were cleaned, and both assumed a normal appearance early in the course of treatment. Some areas were hairless due to the lesions of the skin conditions. Following treatment, hair began to grow in these lesion areas. The new agent has a pleasant odor and will not leave the hair coat with a film which might stain clothing and furniture.

Two Weeks after Third Treatment

Dec. 28, 1951—Note that skin has returned to normal, hair has grown back and assumed its natural glossy appearance.

Summary and Conclusion

A 1% suspension of selenium sulfide (seleen) was employed in the treatment of 40 dogs affected with skin conditions, the types of which are contained in the text. All cases treated were classified as stubborn or difficult; yet of these, 87.5% were completely controlled, and 10.9% were partially controlled. Only 1.6% failed to respond. After one treatment, scratching usually stopped, encrustations and scales were removed, the hair was cleaned, and both the hair and skin assumed a more normal appearance.

Seleen is easy to use, clean, has a pleasant odor, and does not leave a residue which will soil clothing, other fabrics or carpets. Desirable results have followed the use of this preparation, especially since most of those treated failed to respond to other medication employed, some for extended periods.

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Virus Diseases of Dogs

(*Continued from page 284*)

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Ascaricides should cause expulsion of roundworm from the intestinal tract as quickly as possible to avoid decomposition of the parasite *in situ* with the subsequent danger of absorption of the toxic substances that are evolved.

Antibiotics: Their Production And Use*

R. C. KLUSSENDORF,† D.V.M., Terre Haute, Indiana

THE original method used for finding antibiotics was to streak a Petri dish with a known organism, expose it to the air for a time to permit materials to settle on the plate, incubate, and examine for antibiotic substances or bacteriophages. This method was being used by Sir Alexander Fleming when he found the mold which produces penicillin. However, this system is no longer used because it leaves too much to chance. Instead, research in this field is centered in elaborate buildings at various locations.

A systematic search has disclosed the fact that the most prolific source of antibiotic-producing microorganisms is the soil. Samples containing plant roots appear to be more beneficial to the growth and maintenance of microorganisms.

Test for Antibiotic Substance

In the laboratory, soil is diluted with water and spread on the surface of nutrient agar in Petri dishes. Upon incubation, a prolific growth of microorganisms will appear, but this may be regulated somewhat by the composition of the nutrient media. Single colonies can be picked with a sterilized needle and transferred to fresh medium in a test tube. Cultures of many types and colors in wide variety are isolated.

Each new microorganism must be tested for antibiotic production. One method is to streak it across one edge of a Petri dish and permit it to grow for several days to a week. Then a series of known test bacteria are streaked horizontally up to the organism being tested. After reincubation, it can be determined whether the new organism is producing an antibiotic and also which of the known test organisms are inhibited. The degree of inhibition is indicated by the distance through which the antibiotic diffuses into the nutrient agar.

A promising culture is grown in a laboratory flask. Broth is harvested after growth of the organisms and the antibiotic recovered and purified. Optimum conditions for growth are determined by varying the medium and the quantity of nutrient present.

Because most antibiotic-producing microorganisms are aerobic, it was at first thought that they must be grown on the surface of a solid or liquid medium. This was expensive

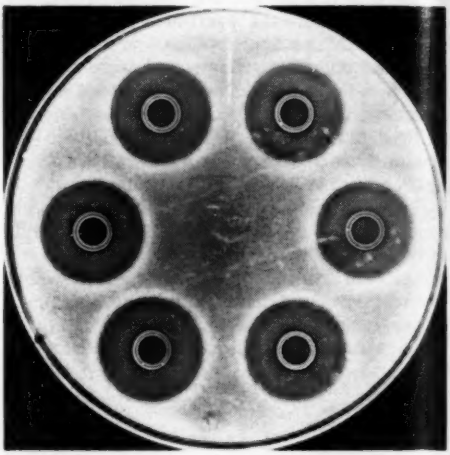

Fig. 1. Petri plate showing method of assay. Antibiotic placed in cylinders diffuses into seeded agar and inhibits growth of bacteria. Width of zone of inhibition indicates amount of antibiotic present permitting comparison with a known standard.

because of the labor involved. Research proved that sterilized air could be blown through a liquid medium to produce aerobic conditions and permit rapid growth of the organisms. On a small scale in the laboratory, this type of growth is simulated by shaking flasks on a specially constructed machine, by either an oscillating or a rotary motion. Air which diffuses through the cotton stoppers is incorporated into the medium to permit greater growth of the antibiotic-producing organism.

Another test is to seed known bacteria on a Petri dish and place broth containing the unidentified substance in a small metal cylinder upon the surface of the agar. (Fig. 1.) During incubation, the seeded organism grows everywhere except in that circle of the cylinder through which an inhibiting antibiotic has diffused. By this method, several types of

*Presented at the 68th annual convention of the Indiana Veterinary Medical Association, Indianapolis, Jan. 9-11, 1952.

†Director of Veterinary Medical Services, Commercial Solvents Corp., Terre Haute.

unknowns may be tested against a known organism or the relative antibiotic activity may be ascertained by varying the amount of broth placed within the metal cylinder.

Each product studied must be checked to determine if it is new or another isolation of one already known. Broth produced in shake flasks is diluted in nutrient agar in a series of dilutions: 1:4, 1:8, 1:16, 1:32, and 1:64.

Fig. 2. Potency and toxicity tests are conducted for each lot of antibiotic tested. Product tested is injected into the caudal vein.

Each plate is then streaked with a series of test bacteria; plates are incubated as usual.

After overnight incubation, the test bacteria have grown except where an antibiotic is strong enough to inhibit such growth. The sensitive organisms may be determined in this way and the degree of sensitivity is indicated by the greatest dilution which inhibits growth. The value of each new antibiotic is determined by the width of its spectrum of activity—that is, by the type of organisms which it inhibits.

Serological Tests

Now it becomes important to know if the newly demonstrated agent is too toxic to be useful for therapy. The first step is to produce enough of the material and to purify it sufficiently so that the pharmacology department may inject mice. (Fig. 2.) If it passes this test, it is produced in larger quantities for therapy in domestic animals.

In the so-called pilot plant, the microorganisms producing the new substance are grown in small fermentors which are counterparts of the large tanks of several thousand gallon capacity. The medium used is that which has been shown by laboratory studies to produce maximum growth and good antibiotic production. Air is blown through this fermentor and the medium is vigorously agitated. The air used is sterilized, which, incidentally, is one of the major items in the cost of production. Temperature is controlled by a water bath on which the fermentor rests.

The first step in the recovery of the antibiotic after incubation is the filtration of the mycelium of the microorganism from the remaining broth. A simple experimental filter may be used when only small amounts of broth are involved.

Now it is necessary to develop methods and procedures which will permit the growing of organisms in larger tanks. This is done by growing it first in eight gallon tanks with all equipment as it will be used in the final stage. These seed tanks contain the most favorable medium, the most favorable amount of air, the correct degree of agitation, sterilization, sampling apparatus, and a defoaming agent. all of which must be provided at this volume of growth. The material in each of these eight gallon tanks is used to seed or inoculate a 10,000 gallon tank in the production plant.

In the pilot plant, the first step in recovery, again, is filtration. One type of filter used in connection with a 60 gallon fermentor is the plate and frame filter. Another is the so-called string filter which is a continuous rotary machine, a small sized adaptation of those actually used in the production plant.

The usual method of recovering and purifying penicillin is by extraction, using butanol or butyl acetate. The Podbelniak super contacter is such an extraction machine and it is used for the recovery of penicillin and bacitracin.

Another recovery method is the adsorption column. Basically, this is operated through the means of an ion exchange resin (IRC-50). Resin columns are used for the recovery of streptomycin and similar antibiotics.

Experimental Trials

At this stage, the antibiotic is produced in sufficient quantities for animal experiments. In all animal testing, tissue changes are important and this involves the use of tissue sectioning and staining equipment. For this, the autotechnicon machine provides automatic control of the steps in the process of fixing and staining tissue. These are then sectioned for microscopic study by a competent pathologist who differentiates between normal tissue and any changes occurring in the animals treated with the new antibiotic.

Production in Quantity

As the mechanical and engineering know-how is developed, the size of the fermentor

tank increases and the next step is the 20,000 gallon tank. This has been increased to 50,000 and 75,000 gallons in some instances. (Fig. 3.)

The use of these large tanks involves considerable quantities of sterile air and a rotary air compressor provides this. These machines have a capacity of approximately 4,000 cubic feet per minute.

In the commercial process, too, the first step in recovery is the filtration of broth from the mycelium. This is done in a large rotary filter, the mycelium being collected on the screen of the inner drum and the broth drawn out through the use of vacuum.

Now, Podbelniak extractors are used in bat-

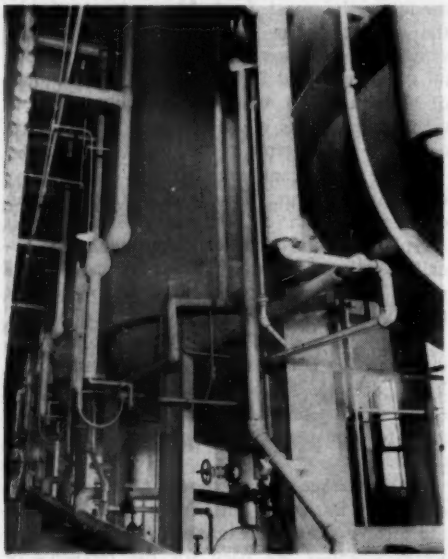

Fig. 3. Bottom of battery of 20,000 gallon fermentation vats. Note size of man for comparison.

teries. Each extractor is essentially a rotor which travels at high speed. Within the rotor is a long spiral tube of small diameter, into which a heavy liquid is fed from the center and a light or solvent liquor from the circumference. Centrifugal force drives the heavier material to the circumference of the rotor and centripetal force draws the lighter liquid to the middle. The rotor is a series of pipes with openings at various places through which the broth and the solvent pass. As they are exposed to each other, the butyl acetate absorbs all the penicillin from the broth. The penicillin-bearing solvent and the spent broth are then removed from opposite openings.

Most antibiotics are unstable in aqueous solution as prepared and, therefore, are dried in vacuum and held in the crystalline form or as an amorphous powder. The process of drying is usually carried out at freezing temperatures because many of these agents are heat labile and lose much of their potency if subjected to temperatures which will evaporate water at atmospheric pressures. This process of freeze-drying is known as lyophilization.

The vacuum for these lyophilizing steps is produced by special pumps. First, there is an ordinary type of rough vacuum and later the greater vacuum is produced by oil vapor pumps. The freeze-out trap is an essential part of this setup.

Having developed a product approaching market grade, ampules or vials for its distribution are washed and sterilized. The final product, whether a concentrated liquid or a crystalline substance, must be packaged for use in hospitals and clinics by physicians and veterinarians. This is done in a sterile area by workers wearing masks, rubber gloves, and other devices designed to reduce contamination to a minimum. Only filtered air is admitted into the room and ultraviolet lights operate at all times to inactivate any material which may have escaped other precautions. Access to a room of this kind is limited to personnel properly garbed and with business in the area. Human contact is reduced to a minimum by using automatic pipetting machines for handling the liquid. This, of course, is all done within the sterile area. Vials are sealed with rubber diaphragm stoppers.

When a batch or lot of antibiotic has been purified, crystallized, and measured for commercial shipment, it is held until there is clearance on sterility, stability, potency, and other factors prescribed and checked by the Food and Drug Administration. These requirements are exactly the same regardless of the ultimate sale of the product; that is, at this stage the FDA does not know whether this product will be used for human patients or will be distributed to veterinarians. The labeling is strictly a matter of commercial expediency because the label must contain recommendations and directions for use in the species to be treated. Only for this reason does the human label differ from the veterinary label. The product within the vial is exactly the same and before being submitted for commercial sale, either type of label may be applied to any vial of penicillin in any lot.

Safety Tests

Meantime, each lot is tested for the presence of pyrogens or fever-producing substances. Such tests are also conducted on all

lots of water or saline placed in the package for dissolving crystals of the antibiotic. Rabbits are placed in batteries, temperatures are taken, then the material being tested is injected in the ear vein and the animals are held for further temperature testing. (Fig. 4.) If the temperature of the rabbits rises more than 0.6 F., the material is presumed to contain pyrogens which would make it unsuitable for use in human or veterinary medicine.

When cleared by the FDA, the label is applied to the package and it is ready for commercial channels. There is no difference in the product bearing a human label and that bearing the veterinary label. All of the preceding steps are carried out in the plant where the agent is produced, purified, and tested.

Available Products

A number of antibiotics are available for use in veterinary medicine. The first of these to appear was tyrothricin, which is used primarily as a topical application in surface infections and as a treatment for mastitis by udder injection and treatment of sore teats which predispose to this condition.

Penicillin was the first of the so-called wide spectrum antibiotics. It is effective against a wide range of organisms and may be administered in several ways. Used on the surface of the body, it tends to produce sensitivity, but when used intramuscularly or intravenously, this is less common.

It is effective in controlling erysipelas infection of turkeys, pigs, and man, as well as in such conditions as anthrax, pyelonephritis, strangles, and mixed bacterial infections. Large amounts of penicillin are used for udder instillation in the control of mastitis caused by streptococci and to a lesser extent by staphylococci. When used parenterally, the antibiotic should be administered at the rate of at least 2,000 units per lb. of body weight, every three to four hours, when administered in aqueous solution; or every 48 to 72 hours when administered in oil and adsorbed on aluminum monostearate.

Streptomycin and dihydrostreptomycin may be used topically, in udder instillation for mastitis, injected intramuscularly for the treatment of systemic infections, or given orally for intestinal infections. When injected into and around lesions of actinomycosis in cattle, they exert a favorable effect upon the healing process.

Aureomycin is another of the so-called wide spectrum antibiotics. It has been used widely in the treatment of bovine mastitis. It may be

Fig. 4. Pyrogen test is essential for all products for systemic use. Temperatures of rabbits are read before and after product is injected into the marginal vein of the ear.

administered topically, intramuscularly, or intravenously.

Bacitracin is one of the newer members of this family of chemotherapeutic agents and it is finding wider use than the topical application which was first indicated. Early forms were incorporated into ointments for treatment of exfoliative dermatitis, particularly those cases which did not respond to routine owner treatment with kerosene and lard, sulfur ointment, durham oil, yeast, trace minerals, and such products. The application of bacitracin ointment daily for two weeks quite often was successful in conditions of this type.

Orally, bacitracin has been found satisfactory in the treatment of vibrionic dysentery in pigs. At dosage levels of from 10,000 to 50,000 units per pig per day for four days, it helps to reduce dehydration and to hasten the recovery of appetite and full weight. It is also effective, in doses of 1,000 to 3,000 units per day, for many types of dysentery of dogs.

Bacitracin ointment has been useful in the treatment of eye conditions, especially those which fail to respond to the usual types of treatment. It has also been of value in the treatment of ear infections of long standing, particularly so-called ear canker. Experimental work is in progress with a parenteral form of bacitracin which, in preliminary trials, gives indication of highly satisfactory use in the treatment of hemorrhagic septicemia and other respiratory and intestinal infections in cattle.

Among others which are being developed, tests on a new substance indicate particular

activity against fungi, notably the trichophyton of ringworm and another which is effective against certain of the viruses.

Antibiotic Feed Supplements

The antibiotic residue or the dried whole beer from fermentation exerts a considerable effect upon the growth of chicks and of pigs. The demand for feed supplements has been so great that special fermentors have been set aside to produce them as the dried whole beer rather than relying only upon the residue from the production of pharmaceutical grades of bacitracin and allied agents. Each of these fermentors has a capacity of 50,000 gallons.

Because it is not necessary to extract the antibiotic from this material, the entire contents of the fermentor are dried on drum driers of this type. The commercial bacitracin product is baciferm-5, which contains 5 gm. of the antibiotic in each pound.

As an indication of the value of these residues, broilers already being fed an adequate ration according to normal standards attained a weight of 4.32 lb. at 12 weeks when bacitracin was added to the ration at the rate of 10 gm. per ton of feed. This weight gain was achieved on 2.85 lb. of feed per lb. of gain.

Suckling pigs creep-fed on a ration containing baciferm at the rate of 2 lb. per ton, which is equivalent to 10 gm. of bacitracin per ton, were weaned at the age of 56 days weighing 42.4 lb. as against 32 lb. for pigs similarly raised but creep-fed on a ration not containing this supplement.

Vitamin B_{12} Production

Another product developed from deep fermentation is vitamin B_{12}. The content of the broth is assayed by growing the lactobacillus on agar and then supplying the unknown broth in small metal cups on the surface of the Petri dish. The lactobacillus requires vitamin B_{12} for multiplication, and growth is seen around each cup only as far as the vitamin had diffused into the medium. For assay purposes, varied amounts of the unknown material to be standardized are placed in rings and the area of growth around the cup indicates the amount of vitamin B_{12} which it contains.

This material also is growth-promoting and the difference in biological value may be determined by feeding a standard or control ration alone and supplemented with vitamin B_{12}. The difference in growth determines the value of the supplement added.

Another byproduct which is being marketed is a form of dextran known as expandex. It is prepared in liquid form ready for distribution to any part of the world. It requires no refrigeration, no reconstitution, and it can be injected intravenously without danger to the blood typing procedure for transfusion of human blood. Although this material is not available for use by veterinarians, its value in the human field is such that later it may prove to be an economical substitute for blood plasma in certain cases of shock in animals.

The study of all these products goes on not only through ordinary microscopic study and through biological research, but also through the use of the electron microscope by which can be demonstrated details of structure not otherwise available.

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Rabies Antiserum

Treatment with rabies hyperimmune serum combined with a course of vaccine was recommended for field trials in human beings by the WHO Expert Committee on Rabies at its meeting in Geneva in April 1950. According to *Public Health Reports*, 67:360 (Apr.) 1952, experimental findings indicate that serum preceding a course of vaccine gives promise of saving most severely exposed human rabies cases in which short incubation time does not allow the development of active immunity.

Iran was designated for the trials. Rabid wolves bit 60 persons in 1949, and 22 persons were bitten during the first four months of 1950. These cases are always severe and at least half the victims are bitten in the head and face. The mortality rate exceeds 30% despite intensive vaccine treatment. The hyperimmune serum treatment would thus be subjected to severe test.

In extensive land areas where rabies exists among domestic and wild animals, the Committee recognized that quarantine measures are impractical.

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No other American has had as many engagements for judging foreign dog shows as Capt. Will Judy, editor of *Dog World*. He and Mrs. Judy will judge the championship exhibitions of the National Italian Kennel Club at Rome this month and have accepted a similar invitation from Johannesburg, South Africa, for October of this year.

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Lack of adequate case records is the single feature most often criticized on inspection of veterinary hospitals. — *Louis H. LaFond, D.V.M.*

Business Principles Of Veterinary Practice*

F. E. BRUTSMAN, D.V.M., Traer, Iowa

THE veterinarian, in his anxiety to fulfill his medical responsibilities, frequently overlooks the significance of practical phases of his professional life.

Literature is indeed scant on this subject, and what is available is scattered in various periodicals and textbooks. The business of practice is nearly, if not equally, as important as technical adeptness. The snobbish blindness of members of learned professions to the business aspects of their occupation is regrettable. Whether he likes it or not, every professional man is engaged in a business of selling his acquired skill and satisfying his clients.

The question may be raised: If these business matters are so valuable, why not emphasize them in training schedules of veterinary schools? There are several answers. The first undoubtedly is scientific and professional snobbishness, blindly ignoring the existence of business in medicine. More important is the fact that the specifically scientific aspects of medicine more than absorb the traditional four years required for a professional degree. Third, nothing can be as important to the student as his scientific and professional training. Finally, education is by no means limited to undergraduate studies. The veterinary practitioner has certainly not encompassed all knowledge nor even all medical knowledge when he receives his diploma, but he has at least learned to recognize new problems and has the technic for approaching them.

Ethics

Of first importance in the practice of veterinary medicine is ethics. Ethics may be defined briefly as the basic principles of right action. They have remained relatively standardized and unchanged over a long period. The practitioner owes his client honesty, reliability, and unselfish attention. The client should be his primary concern. The veterinarian should accept the responsibilities of professional service as paramount over all personal considerations and obligations. Sympathy and understanding between him and his client are vital to accurate diagnosis and successful treatment. In his relations with colleagues, the veterinarian should obey the ordinary rules of courtesy and honor. He should respect the rights and opinions of others and never discredit a professional brother in the hearing of clients. The fact that advertising is considered unethical has no doubt raised the standards of medical practice. Under these circumstances, a man is more likely to succeed by reason of his medical qualifications than his business ability.

Membership in national, state, and local veterinary associations is essential. It enables one to keep up on current developments, thus making possible most efficient service. Also, these associations provide opportunity for discussion of cases, interchange of ideas, and pleasant contacts that stimulate fine friendships.

Prescription for Success

At all times the professional man should be neat and clean in his dress. It should be easy for laymen to identify him. Wear coveralls; they are neat, easy to keep clean, and can be changed readily if soiled. Avoid odoriferous medicines. Most persons object to strong, unaccustomed odors. Change clothing for meals. Put on a shirt and tie; neat, well pressed, and clean clothing is not expensive. Medicine and barnyard odors are objectionable to many persons. When on a farm, wear overshoes, boots, or rubbers; and sponge them thoroughly with water containing a disinfectant before leaving the premises. This not only makes a good impression, but is a habit to cultivate.

Carry towels and a pail. Housewives do not care to have you use their towels. A white enameled pail is inexpensive and easily cleaned.

There are multiple ways to build confidence. Do not overlook the little things. Keep the car clean. Bags free of dust and neatly arranged impress the client and are convenient. Keep medicine bottles and all the necessary paraphernalia well arranged. Do not let your bags gather empty bottles, straw, manure, etc.

Equip yourself with proper instruments and learn to use them expertly. Have enough syringes to use all day without having to sterilize them between calls. Leave this work

*Presented at the 68th annual convention of the Indiana Veterinary Medical Association, Indianapolis, Jan. 9-11, 1952.

for evening or the following day. A stomach tube is a good practice builder. Keep your knives sharp. Do not go out on a castration job with a dull knife. Bard-Parker blades are sharp and handy. Carry a white enameled tray when vaccinating, making an intravenous injection, or doing similar work. It is, of course, a necessity as a container for operative instruments. Avoid all slipshod practices. None of these suggestions is difficult.

When a client enters the office, rise and greet him courteously if you are unoccupied at the time. Put yourself in his position. Speak in terms familiar to him. If he is seeking advice, sit down and talk things over. If he wishes medicine, dispense it. As he leaves, bid him goodbye and make it obvious that you wish him to return.

Never dispense drugs in the original, labeled container. Use utility cartons on which you have clearly indicated the dose and frequency of administration. Record the drug dispensed by name or prescription number.

Problems incident to establishing and collecting fees, while sources of continual annoyance and frequent irritation to practitioners, are, nevertheless, issues that cannot be avoided. To arrive at a fair fee, it is recommended that one find out what colleagues in the surrounding communities are charging. As a general rule, it is poor practice to undercharge. The man who undervalues himself loses caste. A fair yet profitable fee increases prestige and broadens practice. This is, of course, no brief for exorbitant fees. These vary considerably with the section of the country; however, the job of removing the placenta in a cow does not vary with the section. It would seem that some sort of suggested fee schedule could be set up which would assist in standardization. This would, also, be of great assistance to the young graduate just starting in practice.

The Office

Location of the office for convenience of patrons or clients is important. Whether at the home or downtown, it must, of course, be immaculate, orderly, and cheerful, to create a feeling of confidence. Pleasant and tastefully selected furnishings, which may be kept clean, are essential. The same scrupulous care that is used in the home should be applied to housekeeping in the office. Mopping is generally more efficacious than sweeping, since usually the doctor's office is crowded with articles and the broom proves an unwieldy dust disturber. Furniture should be dusted. Curtains in the reception room add a colorful and cheerful note. If soiled and bedraggled, they serve no useful function.

Office Personnel

The method of selecting a new member of the office force, whether assistant or secretary, must be systematized. The aim is to choose the most competent person. It is well to avoid recommendations of a friend. Blind ads are suggested. These request a written reply and give an opportunity to select without injuring anyone's feelings. Working hours should be well defined and adhered to as closely as possible.

Selection of an intelligent and tactful secretary and receptionist may represent the difference between peace of mind and continual worry and concern over the conduct of office affairs. Much of the doctor's time is, of necessity, spent outside his office. He should feel assured that matters which come up during his absence will be handled with tact, intelligence, and dispatch. Intelligence is probably the first characteristic to seek. Given that, skills and technics may be acquired; without it, no learning will be of great value. Educational background, tact, a charming and pleasant manner will all prove of importance in welcoming clients, in gaining their confidence, in making bearable any waiting that might ordinarily prove irksome, and in effecting satisfactory financial arrangements. It is advisable to select someone, who together with the above attributes, possesses particular qualities which supplement those of the veterinarian; one who by her address will fill in the gaps in his ability and perhaps defects in his manner. If he forgets appointments and is allergic to writing letters, his secretary, must have a good memory, be faithful at reminders, and have a facile pen. If he is poor at figures and considers himself awkward at collecting fees and securing payments, his secretary should be able to keep books and handle financial arrangements. To acquire such a paragon of virtues is nearly impossible. It is possible to find a person of desirable qualifications. Under modern conditions, the telephone is actually the practitioner's front door, and the handling of telephone calls is one of the most delicate and important duties which the secretary must perform and one which constitutes an important test of her tact.

The secretary should keep the office tidy, keep the doctor's desk in proper order, sterilize the instruments, greet the arriving clients, take appointments, answer the phone, collect bills, etc. She should use discretion. Indiscreet

conversation concerning the doctor's affairs, professional or otherwise, is unethical and disloyal. Disparaging remarks about former employers only serve to discredit the speaker. In relationships with clients, moreover, the secretary must constantly exhibit tact and understanding, whether in taking case histories, soothing imaginary grievances, or settling financial misunderstandings. She must not bring her personal life into the office, nor have long telephone conversations with her friends during office hours.

Instruments

Constant and scrupulous care of instruments is as important as their initial selection. Prime enemies of instruments are moisture, rough handling, neglect and corrosive chemicals. After use, they should be washed and wiped dry with a clean cloth. Syringes may be placed safely directly into hot water to hasten sterilization. They should be boiled at least ten minutes. If they are suspected of being contaminated with spore-bearing bacilli, 20-minutes' boiling time is required.

Business Methods

Establishment of an efficient system of record keeping is necessary. This is good sound business judgment and is necessary in computing annual income tax. Records need not be complicated, but should be accurate and complete. A simple daily record should include the number of clients seen, amount collected or charged, and amount disbursed. Opposite each client's name should appear a brief explanation of the contact, whether it be for consultation or medicine. One can devise a system of abbreviations so that little space will be taken up for explanation. These entries can be transferred at a later or more convenient time to a monthly sheet by an office assistant. Charge accounts are transferred to a convenient rapid index ledger. Statements should be sent out the first of each month and a mark made in red ink on the ledger sheet to indicate this has been done. This will show at a glance how many statements have been rendered.

On receipt of invoices for drugs and supplies, cost and markup should be noted on the label. This practice insures one price to all clients on the original sale of medicine and, likewise, on repeat orders.

Bookkeeping

The government demands an exact record and report on income. Records must be preserved at least five years and some for longer periods. Submission of a professional income in round numbers might easily arouse a suspicion of inaccuracy, resulting in the annoyance of being required to produce books and records supporting income tax returns, all with consequent loss of time. An elaborate bookkeeping system is by no means necessary nor legally compulsory. However, it is expedient and required that you keep a simple set of accounts showing receipts and disbursements in connection with professional activities. As far as possible, business affairs should be conducted by the use of checks. If bills are paid in cash, get a receipt.

Cost of the furniture and equipment of the office is returned by allowance for depreciation over a period of years computed in accordance with the expected life of the particular equipment. A professional car may have an expected life of three years, while an office desk may be expected to last and be usable for 20 years. Small instruments and equipment with a probable life of not over a year are usually charged off as deductible expense at the time of purchase. It is advisable to keep a record of the dates of purchase of various articles, as well as of their cost and the depreciation claimed from year to year on each, so that the total deductions made on any set of items is never larger than their actual purchase price. This information is also necessary in the event of trading-in business property on new property of like kind. The Department of Internal Revenue would rarely demand a full statement of years of acquisition of all purchases if the total amount involved were small, but it has the right to do so.

The entire matter of income taxes has become a highly technical, specialized field and probably is going to become more important in the business life of every individual. Perhaps the best advice that can be given is to suggest that one select a competent accountant who specializes in the technical field of income taxes, and place the problem in his hands, giving him freely all of the business records and information concerning the practice, and relying on his tax advice.

Summary

The foregoing indicates the many business ramifications of the practice of veterinary medicine. There is need for a book on the subject. It might be adapted as a textbook for professional orientation in the regular college veterinary course. After all, the manner in which a practice is conducted may determine whether the professional man dies in the poorhouse or retires comfortably in later years.

EDITORIAL COMMENTS

Foot-and-Mouth Disease in Great Britain

An editorial on the subject of foot-and-mouth disease appears in the current (May 10, 1952) issue of *The Veterinary Record*. Here it is stated that effective control in Great Britain depends on international cooperation because of the apparent ease of spread of this infection.

Since November 1950, eastern and southeastern counties of England have been subjected to successive invasions of foot-and-mouth disease. Approximately 250 outbreaks have been confirmed and more than 28,000 animals have been slaughtered. Restrictive quarantines have been enforced and a country-wide (England and Wales) standstill order imposed by the Ministry of Agriculture on May 6, 1952. It is understood that this since has been lifted.

Livestock in Great Britain is highly susceptible. Because of proximity to the epizootic raging on the Continent, it is not surprising that infection reached England. The first outbreaks are reported to coincide with the autumn migration of birds and there is little doubt that these were responsible as carriers.

Vaccines now available give inadequate protection. This position also has been taken by authorities in Mexico. In countries of Western Europe now involved, vaccination has been practiced on an extensive scale for years. Failure of vaccination may be because the invading virus differed in type from that used for the preparation of vaccine. Immunity is relatively short and vaccinated animals may have only sufficient immunity to mask symptoms, yet disseminate virus dangerous to susceptible animals. No action that can be taken in Great Britain alone can hope to prevent the introduction of foot-and-mouth disease whenever widespread epizootics occur in Europe. International cooperation is necessary for effective control.

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Dr. A. K. Carr, chief of the Division of Animal Industry, California Department of Agriculture, retired effective March 17, 1952, after 23 years of service. The appointment of Dr. Arthur G. Boyd, who has held the position of assistant chief, to fill the vacancy was announced simultaneously.

Use of Antibiotics as Feed Supplements*

Antibiotics were developed to combat harmful bacteria in treatment of human and animal disease. It was only by accident in the exploration of the growth-stimulating effects of APF supplements that the antibiotic present was found to be one of the growth-promoting substances in addition to the B_{12} complex.

Medical literature defines an antibiotic as a substance tending to destroy life. This seems rather paradoxical when actually the destruction or inhibition of certain types of organisms in the pig stimulates growth (life).

How Antibiotics Function as Feeding Supplements

As yet no clear-cut evidence has been presented which explains the manner in which antibiotics function to promote growth and improve feed utilization in swine. Certain theories have been proposed. Feeding of antibiotics does not change significantly the total number of bacteria or microorganisms in the alimentary tract but it does change the types of organisms present. Thus, it is rather logical to hypothesize that more favorable microorganic flora is produced. How these organisms function is a mystery at present. It may be that they synthesize some unknown nutrient which stimulates growth and well being of hogs. At least it is clear that runt pigs or even healthy pigs do not manufacture this unknown at a rapid enough rate for maximum tissue development unless an antibiotic is present. Some research workers prefer the theory that antibiotics lower the presence of toxic organisms which are either competing for nutrients or inhibiting the tissues from functioning properly. Take your choice; eventually the answer will be known.

Summary of Knowledge Concerning the Use of Antibiotics at Feed Supplement Levels

1. Antibiotics increase the growth rate of hogs about 0.4 lb. daily, or 40 lb. more live weight in 100 days.

2. They improve feed efficiency about 5 to 10%.

*W. M. Beeson, B.S., M.S., Ph.D., Purdue University, Lafayette, Ind. From Memo AH-72, Oct. 1951.

3. A favorable response is obtained from antibiotics with hogs fed either on pasture or in dry lot.

4. Feeding of these agents tends to make a group of hogs grow at the same rate; makes for more uniform market weight.

5. Such feeding eliminates many of the runts and poor doers.

6. It will speed up the gains of either healthy or unhealthy pigs.

7. For maximum gains, antibiotics should be fed from the time the pig starts eating—two weeks of age or earlier until market weight.

8. Comparing hogs of the same market weight (224 lb.), back fat thickness is increased from 1.72 in. to 2.03 (about ¼ in.).

9. Growth stimulation can be secured in swine by feeding aureomycin, bacitracin, penicillin, streptomycin and terramycin, and also many other antibiotics, both known and unknown.

10. The level required for maximum response varies with the antibiotic, the individual animal, the environment and the type of diet. In general, from 5 to 10 mg. of antibiotic per lb. of total finished feed will usually give maximum response. In some cases, lower levels are indicated. There are levels such as 1 mg. of penicillin per lb. of diet which will have no noticeable effect in swine. (See memo AH 68—Purdue University).

11. Feeding these agents to pregnant gilts or sows has no favorable effect on the birth weight, strength, livability or disease resistance of newborn pigs.

12. Evidence supports the fact that antibiotics are not transferred through the mother's milk, at least not in sufficient amounts to affect the growth or health of the nursing pig.

13. Creep feeding antibiotics to pigs during the suckling period will increase the weaning weight (56 days) about 10 lb. or more per pig.

14. Antibiotics are no substitute for well balanced rations, sanitation or disease control. Use them to improve your swine feeding and management practice, not for substitution.

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The Kansas State College, Department of Pathology, reports that on careful culture of samples of imported bone meal, no anthrax bacillus was demonstrated. Some samples revealed heavy contamination with an anaerobic organism of the Clostridia group.

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Trichomonas fetus is not killed by exposure to antibiotics.

A. V. M. A. 89th Annual Meeting, Atlantic City, N. J., June 23-26, 1952

President John R. Wells

The retiring president, Dr. John R. Wells, will be succeeded at the final sessions in Atlantic City by Dr. W. L. Boyd, president-elect.

During his tenure if office, Doctor Wells has repeatedly emphasized the importance of enrollment of all veterinarians in the national association. His stated special objective was directed along this line. He has pointed out in a number of addresses and in published letters various activities of the A.V.M.A. that have been designed to be of value to practitioners and other members.

The national organization represents the profession and can do so most effectively with the full support of veterinarians. Significant results are certain to be forthcoming from these efforts to increase enrollment.

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Incentive Pay for Veterinary Corps Officers

Dean Walter R. Krill, chairman of the Emergency Advisory Committee of the A.V.M.A., appeared before the Senate Committee on Armed Services in behalf of including officers of the Veterinary Corps in the special pay provisions that include those of other medical professions.

Veterinary officers do not now receive incentive pay of $100. per month allowed officers of the Medical Corps.

Rapid Sperm Transport in the Cow

Studies on the speed of spermatozoan transport in the reproductive tract of the cow have shown that sperm deposited in the cervix by artificial insemination reach the ovarian portion of the oviducts in less than 2.5 minutes*. Similar rapid transport takes place after natural mating. The speed of this phenomenon suggests uterine involvement.

Investigations have revealed that various stimuli of natural mating and artificial insemination produce uterine activity in the cow. That this is a result of oxytocin released has been shown by the similar motility patterns produced by injections of oxytocin into the perfusate of excised bovine genital tracts. *In vitro* studies have also revealed that spermatozoan transport can be brought about in the perfused genital tract of the cow by oxytocin injections at or after the deposition of semen into the cervix. Epinephrine diminishes or obliterates the stimulatory effect of oxytocin on the bovine uterus. Because of this action, it is suggested that fright or disturbances to the animal may result in reduced sperm transport. Such an effect could reasonably influence fertility, perhaps in other species.

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Sulfonamide Therapy

Many drugs belonging to the group known as sulfonamides have been studied by chemists and pharmacologists. Only a few have proved useful as chemotherapeutic agents.

In a well prepared and illustrated article entiled, Basic Facts about Sulfa Therapy, Rudolph Seiden, chief chemist, Haver-Glover Laboratories, Kansas City, Mo., outlines the relative value of ten members of the group for the treatment of livestock diseases. The full text appears in the current (May-June 1952) issue of the *Messenger*.

The minimum effective blood value of sulfonamides in general is 5 mg.%; although greater concentrations are desirable under specific conditions. The author states that proper dosage is important and that excessive quantities may be harmful. In regard to crystalluria, given much attention in human medicine, it is stated the the urine of cattle and horses is sufficiently alkaline to prevent crystallization. Danger exists in the treatment of dogs, cats, and other carnivora.

When specific diagnosis of the disease-producing organism is known, one can now select the most efficacious agent, but when doubt exists or when mixed infections are responsible for disease, combined sulfonamide medication is recommended.

*Abstract of paper presented by N. L. Van Demark and R. L. Harp, Department of Dairy Science, University of Illinois, Urbana, at the meeting of the American Society for the Study of Sterility, Chicago, Ill., June 7-8, 1952.

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Fescue Lameness in Cattle

Lameness in cattle, of similar nature to that termed fescue foot or fescue lamness first reported in New Zealand in 1948, is under intensive investigation in Colorado.

The disease was first associated in Colorado with tall fescue grass in 1948, following the New Zealand report, according to Dr. A. A. Goodman, Colorado A. & M. Experiment Station, Fort Collins. At that time, 65 of 240 feeder cattle shipped into western Colorado, where they had access to this grass, developed lameness and sloughed the hoof of one or both hind feet. The malady again became prevalent during the fall and winter of 1951. In the latter outbreak cattle had access to Reed fescue, also termed King, Giant or Ditch Bank fescue, and having the botanical name *Festuca arunincea*, which is the identical species mentioned in the New Zealand reports.

The suspected toxic grass is common on wet, poorly drained land or along ditch banks. It is a tall, coarse, rather unpalatable species which cattle, as a rule, do not graze if other grasses are available. It is not believed that other species of fescue grasses, such as are recommended for range or pasture mixtures, carry any toxic substances.

Feeding trials are under way at the Colorado station to test Reed fescue at various stages of growth to determine whether this common forage plant is responsible for lameness. When such tests are completed, detailed report will be presented in veterinary literature.

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Surveys by the Bureau of Entomology and Plant Quarantine, conducted in cooperation with state agencies in the screwworm overwintering areas, indicate that the insect successfully overwintered in most of Florida and to some extent in south Georgia. However, the number of actual livestock infestations is now low throughout the southeastern and southwestern overwintering areas. Surveys completed in Texas indicate that the mild dry winter has permitted overwinter survival in the southern half of Texas.

VETERINARY PARASITOLOGY

A. O. FOSTER, B.A., M.A., Sc.D.
Beltsville, Maryland

Lungworms in Cattle

Some provocative thoughts about bovine infection with lungworms (*Dictyocaulus viviparus*) have been presented by Doctors Taylor, Hudson, and Sellers[2,4,5] of the Weybridge Veterinary Laboratory and the Cambridge Veterinary Investigation Centre in England. Best established among their conclusions is that antimony lithium thiomalate (anthiomaline) is of no therapeutic value and that intratracheal injections, whatever the drug, are without acceptable proof of their value.

The authors particularly emphasized the injuriousness of lungworms to adult cattle, calves having been regarded heretofore as the principal victims of the affliction, and noted also the persistence of sexually immature worms in the lungs of these animals; a circumstance that contributed greatly to the difficulty of diagnosis. Indeed, lungworm larvae were absent from the feces of all but one animal in a severe outbreak among 49 animals of which 20 were examined, yet the postmortem examination of three animals was considered to have left no doubt about the diagnosis.

Clinically, parasitic bronchitis was observed to be more chronic in adult cattle than in calves. Deaths among calves were ascribed largely to suffocation and exhaustion "following efforts to clear the bronchi of tangled masses of nematodes", whereas mature animals fed well but lost condition, exhibited fluctuations of temperature, and commonly succumbed to secondary bacterial invasion; one offender being *Corynebacterium pyogenes*. Moreover, reduction of milk yield in dairy cows and abortion (presumably because of persistent coughing, an ever-present symptom), were often most alarming to owners.

Diagnostically, persistent coughing and the finding of large numbers of lungworm larvae in the feces were considered significant, especially in calves, but the demonstration of early fifth stage worms at autopsy was a chief criterion in mature cattle. In Guernsey heifers, pulmonary solidification and edema were especially evident in the apical, cardiac, and lower lobes of the lungs.

Of greatest significance is the evidence that bovine lungworm infection may be a cause of heavy loss in animals of all ages, a possibility that should be born in mind by practitioners and a subject to which they are in an excellent position to contribute.

[2]Hudson, J. R., Notes on Husk. *Vet. Rec.*, 63:701, 1951.

[4]Taylor, E. L., Further Notes on Husk. *Vet. Rec.*, 63:703, 1951.

[5]Sellers, K. C., and Taylor, E. L., A Controlled Observation on the Value of Antimony Lithium Thiomalate ("Anthiomaline") in the Treatment of Husk in Cattle. *Vet. Rec.*, 63:707, 1951.

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Safer Drenching with Carbon Tetrachloride

Commenting upon the deaths that sometimes follow winter drenching of sheep for destruction of liver flukes, Dr. W. L. Hindmarsh, chief of the Division of Animal Industry, New South Wales, suggests[1] the following precautions concerning conditions and factors that are known to predispose to ill effects from carbon tetrachloride:

1. Do not drench in bad weather.
2. Do not starve sheep before drenching.
3. Drench early in the morning and return the sheep quietly to their pastures without delay.
4. Use a reputable brand of pure carbon tetrachloride.
5. If drenching ewes that are close to lambing, or if one is using carbon tetrachloride for the first time, treat a few animals at weekly intervals, noting if there are ill effects, before attempting to treat the main flock.
6. Do not drench sheep that may be suffering from mineral deficiencies until they have had access to calcium supplements for at least one week.
7. Do not drench sheep that are grazing on plants which are known to reduce the calcium level in the blood.

Observance of these precautions may not eliminate all losses, but they should help to prevent a very valuable drug from falling into disfavor.

[1]*Ag. Gazette N. S. Wales*, 61:484 (part 9), 1950.

PRINCIPLES OF ANIMAL HEALTH

R. R. DYKSTRA, D.V.M.
Manhattan, Kansas

Anthrax Briefs

Since anthrax recently has made its appearance in cattle herds in several midwestern states, it may not be out of place to review some of the facts regarding it:

1. *Etiology.* Due to *Bacillus anthracis,* an aerobic, non-motile, spore-forming, Gram-positive rod. The spores are resistant to destruction and exist in contaminated soil practically permanently.

2. *Symptoms.* Peracute cases are usually symptomless. Acute cases exhibit high temperatures, depression, edematous areas of the skin, hemorrhagic enteritis, hemoglobinuria from nephritis, hemorrhages of the visible mucosa, and frequently excitement and mania.

3. *Pathology.* Failure of rigor mortis, bloody foam from bodily openings, hemorrhages throughout the body, and enlargement of the spleen.

4. *Diagnosis.* Finding the bacillus in the blood or tissues shortly and temporarily after death. For a positive diagnosis, inoculation of such laboratory animals as guinea pigs, rabbits and mice is necessary; rats are highly resistant.

5. *Control.* Burn carcasses without opening them so as to avoid soil contamination and possible danger to attendants. On known infected herds or infected areas, spore vaccines are used. The spore vaccine is a suspension of anthrax spores in glycerine-saline solution for intradermic use, and spore suspensions in saponin solutions for subcutaneous use. Since the strength of saponin varies, it is recommended to inoculate sheep subcutaneously with progressive dilutions of saponin, and use for vaccine purposes that solution which results in a slight local edema.

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According to reports from research sources, only the visceral form of avian lymphomatosis, also osteopetrosis (marble bones), has been transmitted by cell-free filtrates. The cause or causes of the ocular and neural forms of the disease have not been isolated. Some chickens appear to be carriers of the disease though never showing the clinical symptoms of tumor formation—the latter of a cancer-like type. When the tumor stage is reached, death is almost always the result.

Lack of Mammary Development in Dairy Heifers

In an inquiry referred by a veterinarian, it is stated, in general, that one of his clients has a number of heifers due to calve in 30 or 40 days which seem to have normally developing rear udder quarters, though the front quarters are very much smaller and showing no signs of additional development. Is there a method of treatment to stimulate the further development of secreting tissue in these poorly developed quarters?

We have heard so much about hormones lately that our thoughts turn quite naturally to the use of estrogens, but unfortunately, to the best of our knowledge, there is nothing practical in this field. Mammary development depends on a combination of substances(hormones, if you wish) secreted by several glands. The number of these substances and their interreaction is more complicated than the combination of a bank vault. Furthermore, since the rear quarters of these heifers appear to be normal, our judgment is that there probably is no hormone deficiency. All that this writer can suggest is that when these heifers freshen, regular attempts should be made to get milk from the poorly developed quarters by subjecting the teats to the usual milking manipulations. This is a form of massage and it might be stimulating. Finally, it is not improbable that some hereditary factor is involved in the underdevelopment of the front quarters.

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Another question from a busy "old-timer": "What is the latest approved treatment in the handling of cystic ovaries in cattle—in the past I have usually resorted to the crushing method, but recurrence is frequent?"

The evacuation of the cysts by digital compression, or crushing, simply removes a symptom and does not affect the underlying cause. To reach the real cause of the condition, a hormone with a high luteinizing factor is needed. In doses of 12,000 units intramuscularly (some veterinarians give one-fourth of this dosage intravenously) surprisingly good results follow so that normal ovarian function follows and estrus appears in regular frequency.

PUBLIC HEALTH

JAMES H. STEELE, D.V.M., M.P.H.
Atlanta, Georgia

Fungus Infections of Animals

Dr. Morris A. Gordon has published a very interesting report entitled Veterinary Mycology and Its Public Health Significance, in which he discusses the various types of animal fungus infections that affect man. These include the ringworms of cattle, dogs, cats, horses, and other animals. Favus, the type found in chickens, is also discussed.

Sporotrichosis, a disease found in nature and animals, but rarely ever transmitted to man, is reviewed briefly. It is also pointed out that this has been confused with epizootic lymphangitis in the United States. True epizootic lymphangitis does not occur in this country.

Rhinosporidiosis, a disease which has been reported in man in the United States but not in animals, is mentioned. This is known to occur in animals in Asia, South America, and Africa.

Actinomycosis and actinobacillosis are probably the most commonly reported fungus diseases in animals. It has been well established that actinomycosis is an endogenous infection in man, and presumably, also in animals. The organism Actinobacillus is frequently found in the human mouth in the absence of any signs of disease. There is no evidence of transmission from cattle, hogs, or other animals to man.

The increase in prevalence of histoplasmosis in animals and man in the Midwest has posed an important public health problem. The disease in dogs, as well as in man, is serious and often fatal. A large percentage of cattle, horses, and sheep are reactors through the skin test. There is no evidence of direct transmission of histoplasmosis from animals to man, or from man to animals.

Coccidioidomycosis has been reported in man, cattle, dogs, and desert rodents in southwestern United States. In man and dogs it occurs as a generalized disease. It has also been reported in sheep and a gorilla which was housed in a zoo.

Two other rare diseases caused by fungi are North American blastomycosis and cryptococcosis. North American blastomycosis is felt to have its reservoir in the dog. Most cases have been reported in the central part of the United States. Cryptococcosis has been recorded in horses, cattle, and zoo animals. Recently, there have been accounts of the organism being isolated from milk supplies in Maryland and Wisconsin.

The author points out that there is much to be learned about the extent and seriousness of animal fungus diseases and that all practicing veterinarians should be aware of the problem.

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Malaria

In recent months, medical and public health literature has carried an increasing number of reports of human malaria occurring throughout the United States in veterans returning from Korea. This malaria has been noted to be caused by *Plasmodium vivax*, commonly found in temperate zones, which may have an incubation period of from two weeks to one year. The possibility exists of reintroduction of malaria. Even though this disease has been practically eradicated here it is still a public health threat. In the United States, a natural decline in malaria infection has been apparent since 1935, accelerated by various control procedures. The malaria mortality-rate per 100,000 inhabitants over the whole of the 13 states considered as malarious, declined from 12.6 in 1933 to 0.4 in 1948. In 1943, the Communicable Disease Center of the U. S. Public Health Service began to study the possibility of reducing the transmission of the disease so that it should cease to exist as a public-health problem. It may be said that, to all intents and purposes, that this aim was achieved by 1949.

Malariologists have suggested a number of reasons for the natural decline in the number of cases; among these are better housing, isolation of infected persons, improved environmental sanitation, and public health education. Another factor mentioned is the increased cattle population in the southeastern United States which has affected the feeding habits of mosquitoes. These factors all contributed to the decline, but the availability of insecticides such as DDT insured the success of control operations in areas where malaria previously had been a serious health problem.

Cattle In The Kansas City Flood

WILLIAM R. STUART, D.V.M., Kansas City, Kansas

On Black Friday, July 13, 1951, the worst flood in the country's history broke into the Kansas City stockyards.

For some days the ravages of the Kaw at record floodstage were reported by radio, television and newspaper. Few believed that the water would actually break through the big concrete and dirt levees into the bottom land known as the Central Industrial District. It was more just to satisfy a few pessimists that 2,000 or more cattle in the yards were driven to the fourth floor roof of the hog house.

At about 11:30 a.m. when the first wave of water came rolling down the street in front of the Livestock Exchange Building, all persons

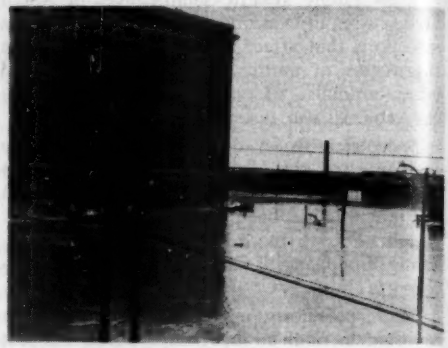
Friday, July 13, 1951, 8 a.m. View looking west over a portion of the empty cattle pens. Note that the water of the Kaw River has already flooded over the dikes on the west bank.

had reached safety and most of the livestock was out of the torrent. The water attained a height of from 18 to 20 feet over the entire yards. A treacherous current hindered workers.

Attempts were made for two days to launch boats with feed for stock marooned atop the big hog house. Each attempt failed because of treacherous currents. It was Monday morning, July 16, before any help was gotten to the livestock.

At this time water was four to five feet deep. Three stockyard officials, one cattle owner and myself climbed aboard an enormous diesel dump truck and headed for the stockyards. The truck could just inch along for the water was threatening to drown out the machine. The truck took us to the nearest fence and the owner and I proceeded to make our way over fences and viaducts to his cattle.

Mr. Haun had 50 Holstein-Friesian cows delayed enroute from Minnesota to Fort Worth. Five cows had calved since confined and each was down suffering from milk fever and complications. They had received no feed or water for 72 hours and the temperature, in the sun, on one thermometer was 120 F.



Men in boats over the cattle pen area at the Kansas City stock yards. Water has begun to recede after attaining a depth at this point of over 20 feet.

Drivers bringing cattle out of the flood up onto ramp of a viaduct.

The cows were given supportive treatment of calcium gluconate and dextrose and a small pail of water. They all responded remarkably well and made the journey successfully to a nearby feed yards. Two calves were dead on arrival.

The next problem seemed to be to get all cattle out of this terrific heat and to some feed and clean water. Loading chutes were constructed on Wyoming Street viaduct opposite the American Royal Building. The cattle were driven into the water to swim the ⅛ of a mile to dry ground. It was impossible to make them move and not drink the flood water on which

was floating a good deal of oil from rupture tanks farther upstream.

Most were loaded aboard trucks and taken to Prospect feed yards. It was the hottest day of the summer to date, 98 F., with no breeze. It is safe to estimate 75% of the cattle were suffering from heat prostration. Many showed symptoms of excitement and a sedative dose of chloral hydrate was given. Other cattle were down with temperatures of 110 F. This is as high as our thermometer would record. Many of these were fed steers of choice and prime quality. The fat made excellent insulation; no heat could escape. Ice water enemas were given along with ice packs on the head and a stimulant was administered some of the weaker animals.

This method of treatment gave discouraging results. It did not give animals relief quickly enough and it was time consuming. Finally, a number of fire hoses were obtained and men took shifts spraying the cattle. Spraying was continued until after dark and the little relief evening would bring. If the water was stopped with the sun still on the cattle, it acted as a steam bath.

With the cool of evening most of the cattle began to get some relief. Those in need of additional aid were given large injections of cool saline. This appeared to give the best results. Administration was discontinued if muscle tremors became noticeable.

As soon as the animals were strong enough to move, most were taken out and put on good pasture for well deserved rest.

EDITOR'S NOTE

Midwesterners are accustomed to adversity. The spirit to reclaim and rebuild and the hard work of many has accomplished remarkable progress. Farms and fields desolated just one year ago are green again and, though evidence of the terrible damage caused by the flood is still apparent in Kansas City and in villages and towns along the river, residents are doing business as usual.

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Use of Sodium Acetate in Acetonemia

GEORGE A. PIPER, D.V.M., Viroqua, Wisconsin

From information supplied by Dr. C. K. Smith of Michigan State College, the writer began using sodium acetate in the treatment of ketosis. No records were kept for several months, or until results were apparent; then a record was kept of each case.

Sodium acetate is used in conjunction with the administration of 500 cc. of 50% glucose for the majority of the cases treated. Urine specimens are tested for ketone bodies before treatment. Results have been good, although no large number of controls have been observed concurrently. Since using sodium acetate, only two of 39 cases treated required repeat treatment.

One patient, exhibiting nervous symptoms, was treated with glucose and 4 oz. of sodium acetate. About three days later, the owner advised that the animal had not improved. One ounce capsules of sodium acetate were dispensed. The owner was instructed to give two capsules 12 hours after giving the first dose of three. The cow brightened up for about two days and again relapsed. This animal then recovered and has remained free of symptoms after retreatment with glucose and sodium acetate.

In another patient which had been off feed and constipated (owner's history) for about two weeks and had lost about 200 lb., glucose alone was injected. Two days later, the owner called and reported no improvement. This cow was then given 500 cc. of 50% glucose and 3 oz. of sodium acetate, followed in 12 hours with two 1 oz. capsules. By the following morning, the animal was bright and ate all of her feed. She has been in good health since.

Twenty-three cases have been treated without the use of glucose. None of these was the nervous form. In ten, the writer did not see the animals. Owners came in with the history that the animals were off feed, losing weight, fresh about four to six weeks and "bound up." Each requested something to relieve constipation. Four capsules, each containing 1 oz. sodium acetate, were dispensed with instructions to give two at 12 hour intervals. Owners were told these capsules would relieve the constipation. Nine animals responded well.

Since starting to keep records, ten cases have been treated with glucose alone, with but one repeat. Any long standing cases were given both glucose and sodium acetate.

The sodium acetate is dispensed in 1 oz. capsules ($10). Dosage level has been as follows:

Holstein	3 oz.	2nd dose in 12 hr., 2 oz.
Guernsey	2 oz.	2nd dose in 12 hr., 2 oz.
Jersey (large)	2 oz.	2nd dose in 12 hr., 2 oz.
Jersey (small)	2 oz.	2nd dose in 12 hr., 1 oz.

Larger doses could be used if necessary. No ill effects have been observed.

Conclusion

In the treatment of 62 cases of ketosis with sodium acetate, results have been good. In long standing cases where two to three treat-

ments with glucose alone would have been necessary, the addition of sodium acetate has been followed by recovery. In 23 mild cases, sodium acetate has been used alone with good results. There have been no ill after effects. Animals appear to regain appetites and become brighter quicker than with glucose alone. Sodium acetate in combination with glucose is superior to the use of glucose alone.

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Canine Pancreatitis and Its Treatment: A Case Report

F. M. BEAM, D.V.M., Washington, Kansas

A three-year-old, male, Brittany Spaniel, unable to digest or utilize fat for the past year, was presented for treatment. Stools contained large amounts of fat, quantity dependent upon the amount of fat in the diet. Mainly because of the dog's inability to properly digest fats, weight during the past year had decreased from 35 lb. to 17 lb.

During this time, the dog had received liver tablets, liver injections, and vitamins, as well as non-specific therapy. Since no change resulted in his condition, a preparation containing edible fatty acids and powdered brewer's dried yeast was tried in recommended therapeutic doses. This also had no effect and the animal continued to lose weight and eliminate grey, greasy stools having a rancid odor.

It was decided to try a treatment used successfully in a similar case by Hodder[1]. The dog was placed on a diet as nearly fat-free as possible. This consisted of ground lean meat and white bread. One-half teaspoonful panteric® granules was given in the feed twice daily. One desicol® kapseal® (equivalent to 2.5 cc. of gallbladder bile or 25-35 cc. of liver bile) was administered three times daily. One abdol® with vitamin C capsule was also given daily.

Within one week the patient had gained 7 lb. and no undigested fat was passing in the stools; in fact, the hair around the rectum showed no signs of grease. After another two weeks' treatment, weight had increased to 30 lb. with a marked positive change in general attitude. The dog was used for two days of hunting.

At this point the diet was changed. Gaines meal and scraps were fed, and medication was continued. The dog continued to show improvement. After another week, the use of enteric-coated panteric tablets was begun in place of the panteric granules. One tablet was given two to three times daily. An urticaria appeared. The desicol kapseals were stopped, but the vitamin capsules continued. The rash completely disappeared, with no further treatment necessary.

Although this dog now eats horse meat, whole wheat bread, and skim milk, no excess fat appears in the stools. He is still receiving one or two enteric-coated pancreatin tablets daily.

®Parke, Davis & Company, Detroit 32, Mich.

REFERENCE

1. Hodder, Charles, Chronic Pancreatitis in a Dog. *Vet. Med.*, 46:416 (Oct.), 1951.

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Parasite Ova in Built-up Litter

In investigations to determine survival of viable parasite ova and oocysts of poultry in built-up litter, Koutz (*Poultry Sci.*, 31:123 [Jan.], 1952) presents data to show that ova of *Ascaridia lineata, Heterakis gallinae,* and *Capillaria retusa,* and oocysts of *Eimeria tenella, E. acerculina,* and *E. maxima* were present in the litter. Furthermore, viability was demonstrated by the presence on post-mortem examination of adult parasites and Coccidia in the intestinal tracts of chickens reared on such litter.

By the term built-up litter is meant the continued rearing of successive groups of chicks on the same litter without any change. Such litter is allowed to accumulate to a depth of several inches and may consist of ground corn cobs, shavings, straw, or other materials. Additions of lime and stirring to prevent caking over is standard practice of poultrymen utilizing this system of rearing young chickens. Koutz has previously pointed out that oocysts of Coccidia will survive under this system of litter management, whether or not lime is added.

Influence of parasitism was considered only incidentally in the experiment reported. Controls reared in battery brooders and free of parasites were heavier than those reared on the built-up litter.

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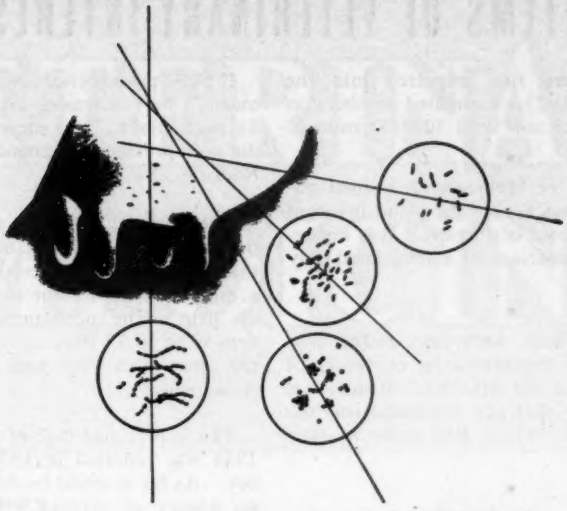
It will be of interest to many veterinarians to learn that the United States Morgan Horse Farm, Middlebury, Vt., which from the date of its inception in 1907 has been administered by the USDA, has by an act of Congress been transferred to the administrative control of the College of Agriculture, University of Vermont, Burlington. The Vermont legislature (1951) voted to accept the farm and appropriated $40,000. to operate it for the next two years.



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ITEMS OF VETERINARY INTEREST

Chinchillas were first imported into the United States in 1923. Estimated numbers on farms and ranches now total 300,000 animals.

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Administration of hormones in normal patients may alter function of the gland involved to defeat the purpose of therapy. It is important that these endocrines be administered only when indicated.

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There can be little doubt that mixed feed supplements were responsible for outbreaks of anthrax in hogs in the Midwest. It does not necessarily follow that raw bonemeal was the only contaminant.—*From BAI letter to state livestock officials.*

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It is interesting and informative that the territory of Hawaii reports that no case of rabies has ever been observed there. This may be accounted for by their isolated position, with ocean barriers and rigid observance of regulations regarding the importation of animals.

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Chloral hydrate is not an anesthetic in the strict sense of the word, nor does its administration result in loss of sensation until there is complete unconsciousness. In the blood stream, chloral hydrate is reduced to trichlorethyl alcohol, and it is this chemical that has a depressing action on the cerebral cortex. Excessive doses result in death from respiratory failure. Even non-lethal doses have a toxic effect so that there is some liver degeneration. Chloral hydrate is properly classified as a hypnotic; it is not an anesthetic.

If slow paying clients ignore monthly statements, I start increasing the amount 50 cents or $1. each month. It is surprising how many will dig up a previous statement and pay it.—*C. M. Rodgers, D.V.M.*

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The Muscovy duck will not cross with other ducks. This bird originated in Brazil and in that country it is not considered to be either a duck or a goose, but is called by the name of "pato". The incubation period of Muscovy eggs is 35 to 37 days as compared to 28 days for other duck eggs and 30 to 34 days for goose eggs.

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The first human case of rabies in Iowa since 1944 was reported in 1951 in a six-year-old boy. As far as could be determined, there was no history of contact with a rabid animal. Such histories are common in children who are exposed to minor dog bites. In the past ten years, the writer has reviewed histories of three children who died of rabies in which no knowledge could be obtained of exposure to rabid animals.

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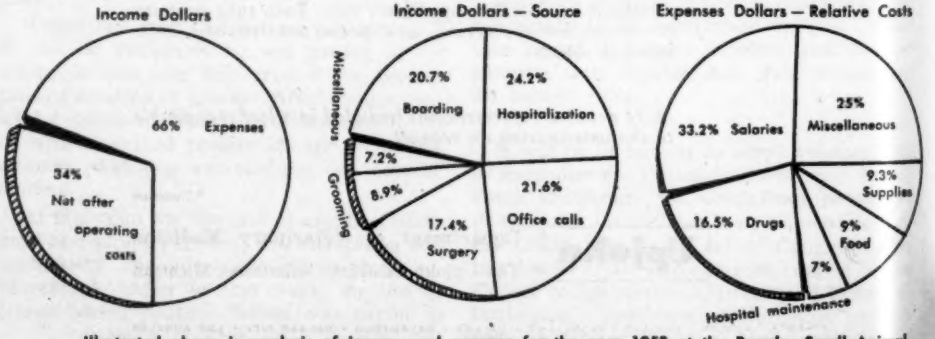
We are informed that sewage plant sludge contains mineral and organic materials valuable as soil fertilizer. Furthermore, the Eastern Regional Research Laboratory of the USDA has found that the mixed microflora in the sludge contains significant amounts of vitamin B_{12} which can be commercially extracted to treat anemia, and to feed animals. It seems then that this waste of sewage treatment, once scorned, has valuable qualities as soil builders and plant feeders, as well as being capable of serving man and his animals.



Illustrated above is analysis of income and expense for the year 1950 at the Ruggles Small Animal Clinic, Moline, Ill. Figures were supplied by Dr. Ralph E. Ruggles, director.